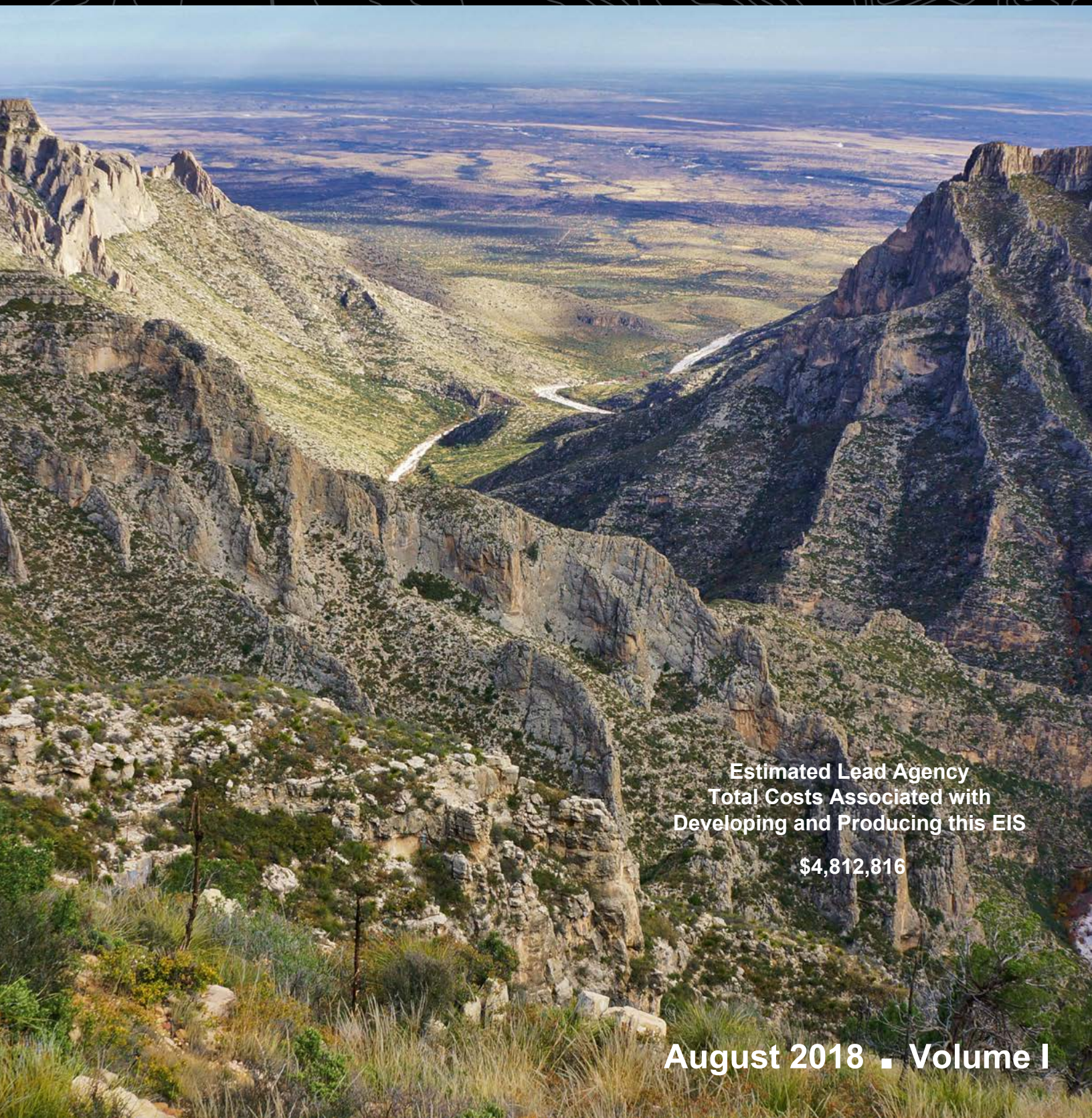
U.S. Department of the Interior
Bureau of Land Management

Draft Resource Management Plan and Environmental Impact Statement

Carlsbad Field Office, Pecos District, New Mexico



Estimated Lead Agency Total Costs Associated with Developing and Producing this EIS

$4,812,816

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
New Mexico State Office
PO Box 27115
Santa Fe, New Mexico 87502-0115
www.blm.gov/nm

In Reply Refer To:
BLM/NM/PL-16-07-1610

Dear Reader:

For your review and comment, enclosed is the Draft Resource Management Plan/Environmental Impact Statement (RMP/EIS) for the public lands managed by the Bureau of Land Management (BLM) Carlsbad Field Office (CFO). The Draft RMP/EIS proposes and analyzes alternatives for future management of approximately 2.8 million acres of federal lands and subsurface minerals in Lea, Eddy, and Chaves Counties in southeastern New Mexico. Volume 1, Chapter 1 of the enclosed Draft RMP/EIS introduces the planning area and the framework for the BLM's decision-making process.

In developing the Draft RMP/EIS, the BLM has considered issues raised through public scoping and consultation and coordination with cooperating agencies and tribes, as well as internal BLM resource specialists, along with planning criteria and a range of options to resolve resource conflicts. This process has resulted in the development of four alternative management scenarios for analysis, along with the No Action Alternative (carrying forward current management). The four proposed management alternatives are A, B, C, and D. These alternatives are described in their entirety in Volume 1, Chapter 2 of the Draft RMP/EIS. Volume 1, Chapter 3 presents the affected environment baseline from which to compare impacts, and Volume 1, Chapter 4 is the analysis of potential impacts to resources or resource uses from implementation of the alternatives. Volume 1, Chapter 5 describes the CFO's consultation and coordination efforts throughout the process.

Based on the alternatives described and the associated analysis of impacts, Alternative C is identified as the Preferred Alternative. Designation of a Preferred Alternative does not represent a BLM decision and should not be viewed as the final outcome. Information received during the public comment period on the Draft RMP/EIS, new information, or changes in BLM policies or priorities may lead to a new or modified alternative being selected in the next iteration of the RMP/EIS, the Proposed RMP/Final EIS. For these reasons, it is essential that you carefully review all alternatives and consider the components of all alternatives when commenting.

Please note that acreage figures in Chapter 2 and throughout the document are based on geographical information system (GIS) data which is subject to constant refinement. Because the data is undergoing changes, however slight, there are potential discrepancies within the acreage figures. Despite these potential discrepancies, the acreages are adequate to provide for a detailed quantitative analysis and comparison of alternatives. This is a draft document and editorial corrections are expected between the draft EIS and the Final EIS.

Once approved, this RMP/EIS will replace the 1988 RMP and subsequent amendments and guide public land management by the CFO into the future. The Draft RMP/EIS and supporting information are available on the project website at: https://www.blm.gov/programs/planning-and-nepa/plans-in-development/new-mexico/carlsbad-rmp. You are invited to provide written comments, which will be used to prepare the Proposed RMP/Final EIS. Comments regarding this Draft RMP/EIS can be sent via any of the following methods:

- **Project Website (ePlanning):** www.blm.gov/new-mexico/carlsbad-rmp
- **Email:** blm_nm_cfo_rmp@blm.gov
- **Fax:** Attn: RMP Lead at (575) 234-5927

- **Mail:** RMP Lead
  BLM Carlsbad Field Office
  620 East Greene Street
  Carlsbad, New Mexico 88220

Comment letters, faxes, and emails must include your complete name, address, and phone number. Anonymous comments will not be considered. Comments for this document must be received within 90 days from the date of the U.S. Environmental Protection Agency's publication of the Notice of Availability in the *Federal Register*.

As a member of the public, your timely, substantive comments on the Draft RMP/EIS will help agency managers and staff to formulate the Proposed RMP/Final EIS. In developing this latter document, which is the next phase of the planning process, the decision maker may select various actions from each of the alternatives analyzed in the Draft RMP/EIS to create a management strategy. This strategy will be designed to best meet the needs of the resources and values of the CFO under the BLM's mandates of multiple use and sustained yield.

We are particularly interested in feedback concerning the adequacy and accuracy of the proposed alternatives, the analysis of the potential environmental impacts of implementing the alternatives, and any new information that would aid in the analysis. Comments are most useful when they address one or more of the following:

- Errors in the analysis
- New information that would have a bearing on the analysis
- Misinformation that could affect the outcome of the analysis
- Requests for clarification

Where possible, refer to the pages and paragraphs on which you are commenting. Comments containing only opinion or preferences will be considered and included as part of the decision-making process, although they will not receive a formal response from the BLM.

The BLM will hold several public meetings to discuss the Draft RMP/EIS. Dates, times, and locations of these meetings will be distributed via newsletter and local news media and posted on the project website. Copies of the Draft RMP/EIS have been sent to affected federal, tribal, state, and local government agencies. They are also available for public inspection at the following BLM locations:

Pecos District Office
2909 West Second Street
Roswell, New Mexico 88201

Hobbs Field Station
414 West Taylor
Hobbs, New Mexico 88240

Carlsbad Field Office
620 East Greene Street
Carlsbad, New Mexico 88220

New Mexico State Office
301 Dinosaur Trail
Santa Fe, New Mexico 87508

The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. Efforts have been made to ensure that the information in the Draft RMP/EIS is accessible. If you have problems accessing information, or if you have questions or would like to obtain an additional copy of the Draft RMP/EIS in either hardcopy or PDF, please contact Hector Gonzalez, RMP Lead, at (575) 234-5968 or blm_nm_cfo_rmp@blm.gov.

Thank you for your participation in this planning effort. For additional information or clarification regarding this document, please contact Hector Gonzalez, RMP Lead, at (575) 234-5968 or blm_nm_cfo_rmp@blm.gov.

Sincerely,

Aden L. Seidlitz

Aden Seidlitz
Acting State Director

Abbreviations

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ABBREVIATIONS

ACEC	areas of critical environmental concern
AML	abandoned mine lands
ANC	acid neutralizing capacity
APD	Application for Permit to Drill
AQB	Air Quality Bureau
AQRVs	air quality related values
ARTSD	Air Resources Technical Support Document
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BMP	best management practice
CFO	Carlsbad Field Office
CFR	Code of Federal Regulations
CMA	Core Management Area
CO	carbon monoxide
COA	condition of approval
CONUS	Continental United States (used in a figure)
CSU	controlled surface use
DAT	deposition analysis threshold
db	decibel
dBa	A-weighted decibel
DOI	U.S. Department of the Interior
DPS	distinct population segment
DSL	dunes sagebrush lizard
dv	deciview
DVF	future design value
DVs	design value
EA	environmental assessment
EGS	enhanced geothermal system
EIS	environmental impact statement
EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERMA	extensive recreation management area
FCRPA	Federal Cave Resources Protection Act
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
FLPMA	Federal Land Policy and Management Act
FMP	fire management plan
FRCC	Fire Regime Condition Class
GHG	greenhouse gas
GIS	geographic information system
H_2S	hydrogen sulfide

HAP	hazardous air pollutant
HMP	habitat management plan
IDLH/10	immediately dangerous to life or health values divided by 10
IM	instruction memorandum
IPA	isolated population area
kg/ha/yr	kilograms per hectare per year
KPLA	known potash leasing area
LAC	limit of acceptable change
LOC	level of concern
LPC	lesser prairie-chicken
LWC	lands with wilderness characteristics
LWCF	Land and Water Conservation Fund
MEI	maximally exposed individual
µeq/L	microequivalents per liter
mg/L	milligrams per liter
MLE	most likely exposure
MLRA	major land resource area
MSC	microbiotic soil crusts
MSHA	Mine Safety and Health Administration
mtpy	metric tons per year
NAAQS	National Ambient Air Quality Standards
NCSS	National Cooperative Soil Survey
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants for Oil & Natural Gas Production
NHPA	National Historic Preservation Act
NMAAQS	New Mexico Ambient Air Quality Standards
NMAC	New Mexico Administrative Code
NMDGF	New Mexico Department of Game and Fish
NMED	New Mexico Environment Department
NMOCD	New Mexico Oil Conservation District
NMOSE	New Mexico Office of the State Engineer
NOI	notice of intent
NO_x	nitrogen oxide(s)
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NWSRS	National Wild and Scenic River System
OHV	off-highway vehicle
ONA	outstanding natural area
OSHA	Occupational Safety and Health Administration

PFC	proper functioning condition
PFYC	Potential Fossil Yield Classification
PL	Public Law
PM_{10}	particulate matter with an aerodynamic diameter less than a nominal 10 micrometers
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than a nominal 2.5 micrometers
POD	plan of development
PPA	primary population area
ppb	parts per billion
ppm	parts per million
PSD	prevention of significant deterioration
psi	pounds per square inch
R&PP	Recreation and Public Purposes Act
RAMP	Recreation Area Management Plan
RELs	reference exposure levels
RfCs	reference concentrations for chronic inhalation
RFD	reasonably foreseeable development
RMP	resource management plan
RMZ	Recreation Management Zone
RNA	research natural area
ROD	Record of Decision
ROW	right-of-way
RV	recreational vehicle
SESA	social and economic study area
SHPO	State Historic Preservation Office
SMA	special management area
SO_2	sulfur dioxide
SRMA	special recreation management area
SSPA	Sparse and Scattered Population Areas
Standards and Guidelines	*New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management*
TCP	traditional cultural property
TDS	total dissolved solids
tpy	tons per year
TSP	total suspended particulates
URF	unit risk factors
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
VRI	Visual Resource Inventory
VRM	Visual Resource Management
VRU	vapor recovery units

WSA	wilderness study area
WSR	wild and scenic river
WSRA	Wild and Scenic River Act
WUI	wildland urban interface

Glossary

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GLOSSARY

ACQUIRED LANDS. Lands in federal ownership that were obtained by the government through purchase, condemnation, gift, or exchange.

ACRE-FOOT (AC-FT). Volume of water that will cover 1 acre of land to a depth of 1 foot; equals 43,560 cubic feet or 325,851 gallons.

ACTIVE LESSER PRAIRIE-CHICKEN LEK SITE. A lek is considered active when, with sufficient annual surveys, two or more males have been seen strutting during the mating season at least one year out of the last five.

ADJUDICATION. A formal court proceeding that results in the determination of the validity and extent of a water right.

AERIAL PHOTOGRAPHY. Photographs taken of the earth's surface from an aircraft. Both color and infrared aerial photographs can be produced that show surface features. Photographs can indicate vegetation changes and water content associated with fractures where caves may be located.

AGGREGATE. Any of several hard, inert materials, such as sand, gravel, slag, or crushed stone, used for mixing with a cementing or bituminous material to form concrete, mortar, or plaster, or used alone, as in railroad ballast or graded fill.

AIR POLLUTION. The general term alluding to the undesirable addition of substances (gases, liquids, or solid particles) to the atmosphere that are foreign to the natural atmosphere or are present in quantities exceeding natural concentrations.

ALKALI LAKES. Shallow plate-like depressions in central portions of basins that drain internally, collect runoff and evaporate rapidly; salt playas.

ALLOTMENT. An area of land designated and managed for grazing of livestock.

ALLOTMENT CATEGORIES. Allotments were placed in one of three categories based on Bureau of Land Management (BLM) criteria shown below. The criteria for each category were numerous and seldom would an allotment meet all criteria for a category.

I or "Improve" category:

- present range condition is unsatisfactory allotments have a moderate or high resource production potential, and are producing at low to moderate levels
- serious resource-use conflicts/controversy exist
- opportunities exist for positive economic return from public investments
- present management appears unsatisfactory

M or "Maintain" category:

- present range condition is satisfactory
- allotments have a moderate or high resource production potential, and are producing near their potential (or trend is moving in that direction)
- no serious resource-use conflicts/controversies exist opportunities may exist for positive economic return from public investments
- present management appears satisfactory

C or "Custodial" category:

- present range condition is not a factor allotments have a low resource production potential, and are producing at low to moderate levels
- limited resource-use conflicts/controversy may exist
- opportunities for positive economic return on public investments do not exist or are constrained by technological or economic factors
- opportunities exist to achieve the allotments potential through changes in management

ALLOTMENT MANAGEMENT PLAN (AMP). A livestock grazing activity plan for a specific allotment based on multiple-use resource management objectives. The AMP considers livestock grazing in relation to other uses of the rangelands and in relation to renewable resources (i.e., watershed, vegetation and wildlife). An AMP includes the seasons of use, number of livestock permitted on the allotment, grazing system, and the rangeland developments needed. AMPs are prepared in consultation, cooperation and coordination with the permittee(s), lessee(s) or other involved affected parties.

ANIMAL UNIT MONTH (AUM). The amount of forage necessary for the sustenance of one cow with a nursing calf or its equivalent for a period of one month.

ANNUAL WATER YIELD. The total stream flow volume that passes a specified point in a watershed during a year. It generally equals total precipitation and irrigation, less evapotranspiration losses and deep seepage losses.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC). Areas within the public land where special management attention is needed to protect and prevent irreparable damage to important historical, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and provide safety from natural hazards.

AUTHORIZED OFFICER. Any person authorized by the Secretary of the lnterior to administer regulations.

AVOIDANCE AREA. An environmentally sensitive area where rights-of-way would be granted only in cases where there is a prevailing need and no practical alternative location exists, and then only with appropriate provisions to protect the sensitive environmental components.

BENEFICIAL USE. The basis, the measure, and the limit of a water right. Agricultural, commercial, industrial, and recreational uses are all considered to be beneficial.

BERM. An embankment or mound of earth or other material. Examples of the use of a berm include use around a tank battery in an oil field to contain spilled fluids or as a barrier across a road or trail to prohibit travel by motor vehicles.

BEST MANAGEMENT PRACTICE (BMP). Method, measure, or practice selected on the basis of site-specific conditions to ensure environmental quality will be maintained or restored to its highest practicable level. BMPs include, but are not limited to, structural and non-structural controls, operations, and maintenance procedures. BMPs can be applied before, during, or after activities to reduce or eliminate impacts to soil, air, water, or vegetation resources.

BIODIVERSITY. Refers to the variety of life and its processes and includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

BLM SPECIAL STATUS PLANT SPECIES. Collectively, species federally listed or proposed for listing under the Endangered Species Act (ESA) and BLM sensitive species, which include both federal candidate species and delisted species within 5 years of delisting.

BUREAU SENSITIVE SPECIES. Species that require special management consideration to avoid potential future listing under the ESA and that have been identified in accordance with BLM Reference Manual 6840.

CALICHE. A brown or white material commonly found as a subsoil deposit in and or semiarid climates that is composed largely of calcium carbonate.

CAVE. Any naturally occurring void, cavity, recess, or system of interconnected passages that occurs beneath the surface of the earth or within a cliff or ledge (including any cave resource therein, but not including any vug, mine, tunnel, aqueduct, or other human-made excavation) and that is large enough to permit an individual to enter, whether or not the entrance is naturally formed or manmade. The term "cave" includes any natural pit, sinkhole, or other feature that is an extension of the entrance. Refer also to "Significant Cave."

CAVE EXPLORATION. The act of entering a naturally occurring void, cavity, recess or system of interconnected passages that occurs beneath the surface of the earth, ledge, or cliff to investigate, study or analyze contents, hazards and extent; to travel into new territories for adventure or discovery.

CLASSIFICATION OF LANDS. The process of determining whether the lands are more valuable or suitable for transfer or use under particular or various public land laws than for retention in federal ownership for management purposes.

COMMERCIAL USE. Defined as recreational use of the public lands and related waters for business or financial gain. When any person, group, or organization makes or attempts to make a profit, receive money, amortize equipment, or obtain goods or services, as compensation from participants in recreational activities occurring on public lands, the use is considered commercial. An activity, service, or use is commercial if anyone collects a fee or receives other compensation that is not strictly a sharing of, or is in excess of, actual expenses incurred for the purposes of the activity, service or use. Commercial use is also characterized by situations where a duty of care or expectation of safety is owed participants as a result of compensation. It may also be characterized by public advertising for participants.

Use by scientific, educational, and therapeutic institutions or non-profit organizations is considered commercial when the above criteria are met and subject to a permit when the above conditions exist. Non-profit status of any group or organization does not, in itself, determine whether an event or activity arranged by such a group or organization is noncommercial. Profit-making organizations are automatically classified as commercial, even if that part of their activity covered by the permit is not profit-making.

COMMUNITY. A group of plants and animals living together in a common area having close interactions.

COMMUNITY PIT. A site from which non-exclusive disposals of mineral materials can be made.

COMPETITIVE USE. Any organized, sanctioned, or structured use, event, or activity on public land in which two or more contestants compete and any of the following elements apply:

(1) Participants register, enter, or complete an application for the event; or
(2) A predetermined course or area is designated.

It also means one or more individuals contesting an established record such as speed or endurance.

CONDITION OF APPROVAL (COA). A requirement appended to a use authorization that must be met in order to be in conformance with the authorization. Conditions of approval may be standard practices that are routinely applied or may be special requirements developed through the National Environmental Policy Act (NEPA) process. Conditions of approval usually are applied to mitigate the impacts of an action. Conditions of approval do not modify any rights granted by a lease (e.g., an oil and gas lease).

CONSERVATION (ARCHAEOLOGY). A level of management applied to cultural resources exhibiting uniqueness or relative scarcity of similar cultural properties; research potential that surpasses current state of the art; or singular historic importance or architectural interest.

COORDINATED RESOURCE MANAGEMENT PLAN. A plan for management of one or more grazing allotments that involve all the affected resources, e.g., range, wildlife, watershed, minerals, and recreation.

CORRIDOR. A linear strip of land forming a passageway between two points in which transportation and/or utility systems exist or may be located. A designated corridor is the preferred location for existing and future rights-of-way grants that have been identified by law, by secretarial order, through land use planning, or by other management decision.

CRITICAL HABITAT. BLM adheres to U.S. Fish and Wildlife Service (USFWS) definitions for designated critical habitats. In general, these are specific geographic areas, whether occupied by the listed species or not, that are determined to be essential for the conservation and management of an ESA of 1973 listed species, and that have been formally described in the *Federal Register*.

CULTURAL RESOURCE. The fragile and non-renewable remains of human activity, occupation, or endeavor reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in human events. These resources consist of physical remains, areas where significant human events occurred even though evidence of the event no longer remains, and the environment immediately surrounding the actual resource and oral history or ethnographic accounts of life ways and customs.

DESIGNATION. The official identification and naming of a general area or site on public land. Lands may be designated when they are either (1) withdrawn, (2) given special status by act of Congress, or (3) established by an approved land use plan.

DESIGNATED USES. Surface water uses specified by the Water Quality Control Commission for which water quality standards have been established. Designated uses apply whether or not they are being attained.

DESIRED PLANT COMMUNITY (DPC). The plant community that provides the vegetation attributes required for meeting or exceeding Resource Management Plan (RMP) vegetation objectives. The DPC must be within an ecological site's capability to produce these attributes through natural succession, management action, or both. A specific description of the vegetation needed to meet the vegetation objectives of a detailed activity plan or implementing action can be described as a desired plant community. Seeding mixtures under DPC would emphasize the use of native species and avoid noxious weeds and exotic species.

DISTRICT. The specific area of public land administered by a District Manager.

DIVERSION. A human-made construction that diverts water from its natural source to be put to beneficial use.

DIVERSITY. The relative degree of abundance of wildlife species, plant species, communities, habitats, or habitat features per unit area.

DRAINAGE. A term used in oil and natural gas extraction meaning the pool of either resource is “drained” or removed either through existing pressure or pumping. These pools may extend beyond the surface ownership boundaries and a well drilled on one surface owner may drain the resource underneath an adjacent surface owner.

DRASTIC. A method developed by the U.S. Environmental Protection Agency for evaluating the potential for groundwater pollution. The name "DRASTIC" is an acronym for the seven hydrogeologic factors that the method uses to produce the Drastic Index. The Index is a numerical value that helps prioritize areas with respect to groundwater contamination vulnerability. The factors are: Depth to water; Recharge; Aquifer media; Soil media; Topography (i.e., slope); Impact of the vadose zone; and, Conductivity (hydraulic) of the aquifer.

ECOLOGICAL SITE INVENTORY (ESI). The effort and documentation needed to establish realistic, achievable, and measurable vegetation management objectives.

ECOSYSTEM. A complex self-sustaining natural system that includes living and nonliving components of the environment and the circulation of matter and energy between organisms and their environment.

ENDANGERED SPECIES (FEDERAL). An animal or plant species whose prospects of survival and reproduction are in immediate jeopardy and in danger of extinction throughout all or a significant portion of its range, as defined by the USFWS under the authority of the ESA of 1973, as amended. Whether a species is threatened or endangered is determined by the following factors: (1) present or threatened destruction, modification, or curtailment of its habitat or range; (2) over utilization for commercial, sporting, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors. Also, see "Threatened Species (Federal)" in the Glossary.

ENDANGERED SPECIES (STATE). Any species or subspecies whose prospects of survival or recruitment in New Mexico are in jeopardy. Also, see "Threatened Species (State)" in the Glossary.

ENVIRONMENTAL ASSESSMENT (EA). The procedure for analyzing the impacts of some proposed action on a given environment and the documentation of that analysis. An EA is similar to an environmental impact statement (EIS) but is generally smaller in scope. An EA may be preliminary to an EIS.

ENVIRONMENTAL IMPACT STATEMENT (EIS). The procedure for analyzing the impacts (both beneficial and adverse) of a proposed action on a given environment, and the documentation of that analysis.

ENVIRONMENTAL JUSTICE. The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM (EQIP). A voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agricultural land.

EPHEMERAL. A stream or portion of a stream that flows in direct response to precipitation, lasts for a short period of time, and is not influenced by ground water sources. Also pertains to playa lakes that can be intermittently wet.

ESSENTIAL HABITAT. Habitat in which threatened and endangered species occur, but which has not been declared as critical habitat. Occupied habitat or suitable unoccupied habitat necessary for the protection and recovery of a federally designated proposed, candidate, threatened, or endangered species.

EXCEPTION. Case-by-case exemption from a lease stipulation. The stipulation continues to apply to all other sites within the leasehold to which the restrictive criteria apply.

EXCHANGE. A trading of public land (surface or subsurface estates) that usually does not have high public value, for lands in other ownerships that do have value for public use, management and enjoyment. The exchange may be for the benefit of other federal agencies as well as the BLM.

EXCLUSION AREAS. Areas where future rights-of-way may be granted only when mandated by law.

EXTENSIVE RECREATION MANAGEMENT AREA (ERMA). Areas where recreation is unstructured and dispersed and where minimal recreation-related investments are required. ERMAs provide recreation visitors the freedom of choice with minimal regulatory constraint. These areas consist of the remainder of land areas not included in Special Recreation Management Areas within a District or Field Office area.

FEDERAL CAVE RESOURCES PROTECTION ACT (FCRPA) OF 1988. The purposes of this act are (1) to secure, protect, and preserve significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people; and (2) to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on federal lands for scientific, education, or recreational purposes.

FEDERAL LAND. Land owned by the United States and administered by the federal government. Federal land includes public land (see Public Land in the Glossary).

FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA) OF 1976. Public Law 94-579, gives the BLM legal authority to establish public land policy; to establish guidelines for administering such policy; and to provide for the management, protection, development, and enhancement of the public land. Often referred to and pronounced "flipma."

FEDERAL RESERVED WATER RIGHT. A water right that is reserved by the federal government when land is withdrawn from the public domain for a particular purpose, such as national parks, forests, and monuments. The amount of water reserved is only that necessary to fulfill the intended purpose.

FIELD OFFICE. The smallest administrative subdivision of a BLM district. A Field Office is administered by a Field Manager and is the equivalent of a resource area.

FIRE MANAGEMENT UNIT (FMU). A land management area definable by objectives, management constraints, topographic features, access, values to be protected, political boundaries, fuel types, major fire regime groups, etc. that set it apart from the characteristics of an adjacent FMU. The FMU may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

FIRE REGIME CURRENT CONDITION CLASS (FRCC). A qualitative measure classified into three classes describing the relative degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings.

FLOODPLAIN. See "One Hundred-Year Floodplain" in the Glossary.

FLOWLINE. The surface pipe through which oil, water, or gas travels from a well to processing equipment or to storage.

FRAGILE SOIL. A soil that is easily damaged by use or disturbance. Examples include soils that are susceptible to compaction or other mechanic damage to their structure, or soils that are highly erodible when disturbed.

GEOGRAPHIC INFORMATION SYSTEM (GIS). Through the use of computer technology, GIS allows the input, storage, analysis, and display of a great volume and variety of physically locatable data (i.e., data that are known to exist at some specific place or area on the ground).

GRANT. A gift of public land either in quantity or in place. Also, the document or the action that conveys land or an interest in land.

GRAZING CAPACITY. The maximum livestock stocking rate possible without inducing damage to vegetation or related resources such as watershed. This incorporates factors such as suitability of the rangeland for grazing a well as the proper use that can be made on all of the plants within the area. Normally expressed in terms of acres per animal unit month (AUM) or sometimes referred to as the total AUMs that are available in any given area, such as an allotment. Areas that are unsuitable for livestock use are not computed in the grazing capacity. Grazing capacity may or may not be the same as the stocking rate.

GRAZING DISTRICT. Means the specific area within which the public land are administered under Section 3 of the Taylor Grazing Act. Public land outside grazing district boundaries is administered under Section 15 of the Taylor Grazing Act.

GROUND WATER. Subsurface water contained in interconnected pores between soil or rock particles in a zone of saturation. Groundwater includes underground lakes and streams in karst areas.

HABITAT. The location where a particular taxon of plant or animal lives and its surroundings (both living and nonliving) and includes the presence of a group of particular environmental conditions surrounding an organism, including air, water, soil, mineral elements, moisture, temperature and topography.

HABITAT MANAGEMENT PLAN (HMP). A written and officially approved plan for a specific geographical area of public land that identifies wildlife habitat and related objectives, establishes the sequence of actions for achieving objectives, and outlines procedures for evaluating accomplishments.

HAZARDOUS MATERIAL. Any substance posing a threat to the health or safety of persons or the environment. These includes but is not limited to Resource Conservation and Recovery Act hazardous wastes, Comprehensive Environmental Response, Compensation, and Liability Act and Clean Water Act hazardous substances, U.S. Department of Transportation hazardous materials, Occupational Safety and Health Administration hazardous chemicals, Superfund Amendments and Reauthorization Act Title III toxics and extremely hazardous substances, and biological and disease-causing agents.

HISTORICAL USE. The average of the highest two use seasons in the preceding five-year period.

INFORMATION (ARCHAEOLOGY). A level of management applied to cultural resources. Most sites fall into this category and would be studied for the information that could be retrieved from them. The process of extracting information often destroys the site. These sites could be lithic scatters, campsites, and other types of sites.

INTERMITTENT STREAM. A stream that does not flow year round but has some association with groundwater for surface or subsurface flows.

KARST. A landform where the topography has been formed chiefly by the dissolving of rock. In some cases, the dissolving of rock may be extensive enough to form passages through which an individual could pass. Surface expressions include sinking streams, swallets, springs and resurgences, and the presence of sinkholes and caves. Surface streams are few, with most of the drainage being underground. These features are important for groundwater recharge of karst systems.

KNOWN POTASH LEASING AREA. Identified areas with valuable deposits of potash where prospecting permits may not be issued, and any leasing must be done on a competitive basis. **LEASABLE MINERALS.** Minerals or materials administered under the Mineral Leasing Act of 1920, as amended and supplemented (30 USC 181, et seq.), the Mineral Leasing Act for Acquired Lands of 1947, as amended and supplemented (30 USC 351, et seq.), and the Geothermal Steam Act of 1970, as amended and supplemented (30 USC 1001, et seq.). These include cloal, phosphate, asphalt, sulphur, potassium, sodium, oil, gas and geothermal.

LEASE. An authorization to possess and use public land for a fixed period of time (usually long term). Also, any contract, profit-share arrangement, joint venture, or other agreement issued or approved by the United States Government under a mineral leasing law that authorizes exploration for, extraction of, or removal of oil and gas resources.

LEASE NOTICE. An attachment to an oil and gas lease that transmits information at the time of lease issuance to assist a lessee in submitting acceptable plans of operation, or to assist in administration of leases. A lease notice is used to disclose a situation or condition known to exist that could affect lease operations. Lease notices are not a basis for denial of lease operations.

LEGAL ACCESS. In the context of access to public land, especially public land tracts that may be adjacent to or surrounded by land of other ownerships, legal access exists when a person can reach a given public land tract without trespassing, such as from a public road or highway, or from another tract of public land. (See "Physical Access.")

LENTIC. Pertaining to static, calm, or slow moving water or aquatic habitats, such as a marsh.

LEK. A specific area (also termed display, gobbling, booming or strutting grounds) where two or more lesser prairie-chicken cocks congregate, typically year after year, for courtship displays in early spring, and vary in size from one-eighth acre to several acres.

LOCATABLE MINERALS. Minerals subject to disposal and development through the Mining Law of 1872 (as amended). Includes all "valuable mineral deposits" including metallic and nonmetallic minerals such as gold, lead, barite, fluorspar or high calcium limestone. It also includes uncommon varieties of sand, stone, gravel, cinders, pumice, pumicite and clay. Also included are all valuable minerals that are not excluded under the leasable and salable minerals.

MANAGEMENT FRAMEWORK PLAN (MFP). A planning decision document now replaced by RMPs that establishes for a given planning area land use allocations, coordination guidelines for multiple use, and management objectives to be achieved for each class of land use or protection.

MINERAL MATERIALS. Minerals such as common varieties of sand, stone, gravel, pumice, pumicite and clay that are not obtainable under the mining or leasing laws but that can be obtained under the Materials Act of 1947, as amended. Also known as saleable (or salable) minerals.

MODERN URBAN. Areas with recreation opportunities to experience affiliation with individuals and groups are prevalent as in the convenience of sites and opportunities. Experiencing the natural environment and the use of outdoor skills are largely unimportant. One of the six classes of the Recreation Opportunity Spectrum (ROS).

MODIFICATION. A fundamental change in the provisions of a lease stipulation, either temporarily or for the term of the lease. A modification may, therefore, include an exemption from or an alteration to a stipulated requirement. Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive stipulation applies.

MULTIPLE USE MANAGEMENT. Management of public land and their various resource values so they are used in the combination best meeting the present and future needs of the American people. Such a concept allows for the most judicious use of some or all of the resources over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions. Relative resource values are considered, not necessarily the combination of uses that would give the greatest potential economic return or the greatest unit output.

NATIONAL REGISTER OF HISTORIC PLACES (NRHP). A list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture.

NATIONAL TRAILS SYSTEM. The National Trails System is composed of four types of trails: (1) national recreation trails; (2) national scenic trails; (3) national historic trails; and (4) connecting or side trails. National recreation trails provide for numerous outdoor recreation activities in a variety of urban, rural, and remote areas. They may be designated by the Secretary of the Interior or by the Secretary of Agriculture where lands administered by that agency are involved.

NONCOMMERCIAL USE. A recreational activity on public land or related waters where actual expenses are shared equally among all members or participants. Any person, group, or organization seeking to qualify as noncommercial must establish to the satisfaction of BLM that no financial or business gain will be derived from the proposed use. Fund raising, for any purpose, renders an activity a commercial use.

NONPOINT SOURCE POLLUTION (NPS). The alteration of waters by activities not regulated as point sources, which degrade the quality or adversely affect the biological community inhabiting the waters.

NO SURFACE OCCUPANCY (NSO). A condition of surface use attached to a lease or other authorization applied to minerals exploration and development that prohibits occupancy of only the land surface or to protect other identified resource values.

NOXIOUS WEED. A plant that causes disease or has other adverse effects on the human environment and is, therefore, detrimental to the agriculture and commerce of the United States and public health. Generally, noxious weeds possess one or more of the characteristics of being aggressive and difficult to manage, parasitic, a carrier or host of harmful insects or disease, and being either native, new to, or not common in, the United States. In most cases, however, noxious weeds are non-native species. Noxious weeds are designated and regulated by various state and federal laws.

OCCUPIED HABITAT. Unless previously defined for a particular species, an area where a species' physical occupation has been observed and documented as active, wholly or in part of its lifecycle or range. In the case of life phases, species or habitats that are difficult to survey (e.g., annual plants, cliffs), where surveys may not include the full distribution of the species, suitable habitat adjacent to known occupied habitat may also be treated as occupied habitat. For pants, occupied habitat includes immediately adjacent areas where seeds are likely in the ground (an additional 10 meters will account for most seed dispersal).

OCCUPIED LESSER PRAIRIE-CHICKEN HABITAT. Suitable habitat within 3 miles of any lesser prairie-chicken (LPC) detection within the past 5 years.

OCCUPIED RAPTOR NEST. An occupied raptor nest is defined as a large stick nest with the observation of one or more raptors within the nest or within the immediate vicinity of the nest and/or evidence of raptor occupation (e.g. recent nest material, prey remains) during the breeding season (March–June).

OFF-HIGHWAY VEHICLE (OHV). Any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: (1) any non-amphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is expressly authorized by the authorized officer, or otherwise officially approved; (4) vehicles in official use; and (5) any combat or combat support vehicle when used for national defense.

Open: Vehicle travel is permitted in the area (both on and off roads) if the vehicle is operated responsibly in a manner not causing, or unlikely to cause significant, undue damage to or disturbance of the soil, wildlife, wildlife habitat, improvements, cultural, or vegetative resources of other authorized uses of the public land.

Limited: Designated areas and trails where the use of an OHV is subject to restrictions, such as limiting the number on types of vehicles allowed, or dates and times of use (seasonal restrictions); limiting use to designated roads and trails. Combinations of restrictions are possible, such as limiting use to certain types of vehicles during certain times of the year.

Closed: Designated areas, roads, and trails where the use of an OHV is permanently or temporarily prohibited. Emergency use of vehicles allowed.

ONE HUNDRED-YEAR FLOOD. The flood that will be equaled or exceeded an average of once every 100 years; i.e., the flood that has a 1% chance of being equaled or exceeded in any given year.

ONE HUNDRED-YEAR FLOODPLAIN. The area adjacent to a stream or body of water that would be inundated at the peak of the one hundred-year flood. The floodplain delineated on Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) published by the Federal Emergency Management Agency will be used for management purposes. When a FIRM or FHBM is not available for the area of interest, the best available information will be used.

OPERATING PLAN. An applicant's/permittee's plan to conduct their activity or event on public lands or related waters in conjunction with a Special Recreation Permit. An operating plan will describe at a minimum how services will be delivered, how an event will be conducted, and describes measures that will be implemented to protect resources and provide for public health and safety.

ORGANIZED GROUP ACTIVITY OR EVENT. A structured, ordered, consolidated, or scheduled event or occupation of public lands for the purpose of recreational use that is not commercial or competitive, and which the BLM has determined needs a special recreation permit based on planning decisions, resource concerns, potential user conflicts, or public health and safety.

PAYMENT IN LIEU OF TAXES (PILT). Payments to local or state governments based on ownership of federal land and not directly dependent on production of outputs or receipt sharing.

PERENNIAL STREAM. Surface water normally flows throughout the year except during infrequent years of drought.

PERMIT (GRAZING). A document authorizing use of the public land within grazing districts under Section 3 of the Taylor Grazing Act for the purpose of grazing livestock.

PERMIT. An authorization, revocable by or at the discretion of the BLM, to utilize public lands for a fixed period of time. A permit conveys no possessory interest in the land.

PERMITTEE. An individual, group or organization who has fulfilled all the requirements for and has been awarded a permit.

PETROGLYPH. A form of rock art manufactured by incising, scratching, or pecking designs into rock surfaces.

PHREATOPHYTE. A type of plant common to all regions that has an extensive root system to draw water directly from the water table.

PHYSICAL ACCESS. In the context of access to public land, especially public land tracts that may be adjacent to or surrounded by land of other ownerships, physical access exists when a person can physically reach a given public land tract. The existence of physical access does not always mean that legal access exists. In some cases, taking advantage of physical access may involve trespass. (See "Legal Access.")

PIPELINE. A system of connected lengths of steel or plastic pipe, laid either in the earth or on the surface that is used for transporting petroleum, petroleum products, chemicals, natural gas, or other fluids.

PLAN OF DEVELOPMENT. A document submitted with a right-of-way application that includes project details such as the purpose and need for the project, location details, design factors, additional temporary workspace, agencies and jurisdictions involved, construction and reclamation plans, operations plans, and environmental constraints.

PLAYA. A shallow, nearly level, often saline, dry lake bed. Playas vary considerably in materials, salinity, and hydrologic regime. In general, playas: (1) collect surface runoff in closed basins; (2) are poorly vegetated; (3) are ephemerally flooded; and (4) have a thin surface of non-gravelly, fine-textured sediment.

POINT SOURCE POLLUTION. Pollution discharged from any discernible, confined, and discrete conveyance into a water body; e.g., effluent from a pipe. Point source pollution does not include return flow from irrigated agricultural land.

POTENTIAL HABITAT. Unless previously defined for a particular species, areas predicted to be suitable for a species' occupation, wholly or in part of its lifecycle or range. These areas have been modeled or assessed through mapping (i.e., GIS, aerial imagery) to contain elements expected to provide suitable habitat for the target species. Models and assessments may be based on proximity to occupied habitat, associated species, canopy cover, specific substrates (i.e., formation soil units), climate, hydrological features, slopes, aspects and/or elevation ranges, but are not limited to these factors. Potential habitat may or may not have been assessed.

POTENTIALLY SUITABLE LESSER PRAIRIE-CHICKEN HABITAT. Unoccupied areas of appropriate vegetation type, but in patches of less than 320 acres and/or falling within Robel impact/avoidance distances around infrastructure.

PRECIPITATION. Any or all forms of water particles, liquid, or solid that fall from the atmosphere and reach the ground.

PRESCRIBED FIRE. Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

PRESCRIPTION. A written statement defining objectives to be attained as well as temperature, humidity, wind direction and wind speed, fuel moisture content, and soil moisture under which a fire will be allowed to burn, generally expressed as acceptable ranges of the various indices, and the limit of the geographic area to be covered.

PRIMITIVE (P). Areas with recreation opportunities for isolation from the sights and sounds of man, to feel a part of the natural environmental, to have a high degree of challenge and risk, and to use outdoor skills. One of the six classes of the Recreation Opportunity Spectrum (ROS).

PUBLIC LAND. Any land and interest in land owned by the United States within the several states and administered by the Secretary of the Interior through the Bureau of the Land Management, without regard to how the United States acquired ownership, except (1) land located on the Outer Continental Shelf; and (2) land held for the benefit of Indians, Aleuts, and Eskimos.

PUBLIC VALUES AND INTERPRETATION (ARCHAEOLOGY). A level of management of cultural sites that contribute to the belief systems and folkways of a cultural group such as locations having religious significance. Public interpretive sites would have qualities that would lend themselves to being utilized as recreation, education, and interpretive areas.

QUARRYING (MINING). The extraction of building stone or other valuable nonmetallic constituent from a surface mine, or quarry.

RANGE IMPROVEMENT. An authorized activity or program on or relating to rangelands that is designed to improve production of forage; range vegetative composition; control patterns of use; provide water; stabilize soil and water conditions; and provide habitat for livestock, wild horses or burros, and wildlife. The term includes, but is not limited to structures, treatment projects, and use of mechanical means to accomplish the desired results.

RANGELAND. Land used for grazing by livestock and big game animals on which the vegetation is dominated by grasses, grass-like plants, forbs, or shrubs.

RAPTOR. A bird of prey, such as an eagle, hawk, or owl.

RECLAMATION. The reconstruction of disturbance by returning the land to a condition approximate or equal to that which existed prior to disturbance, or to a stable and productive condition compatible with the land use plan. The immediate goal of reclamation is to stabilize disturbed areas and protect both disturbed and adjacent undisturbed areas from unnecessary degradation.

RECREATION AND PUBLIC PURPOSES ACT (R&PP). The Act of June 14, 1926, as amended (43 United States Code 869, 869-4). Allows the disposal of public land to any state, local, federal, or political instrumentality or nonprofit organization or any recreational or public purpose, at the discretion of the authorized officer.

RECREATION AREA/SITE. An area of recreation may be a site, complex of sites, or a high impact recreation area that, at a minimum, meets all of the conditions in REA Chapter 3(f)(4)(A-D). Further Definition: High-Impact Recreation Area, Geographic area, or Waterway Corridor: A high impact recreation area or geographic area or waterway corridor of concentrated recreation use that includes a variety of developed sites providing a similar recreation opportunity. High-impact recreation areas incur significant expenditures for restoration, public safety, sanitation facilities, education, maintenance, and other activities necessary to protect the health and safety of visitors, cultural resources and the natural environment. They may contain sub-areas of little development and use that results in environmental impacts such as noticeable litter, vandalism, soil compaction, or erosion. These areas require intensive management to enhance visitor experiences, address environmental impacts, and manage conflicting uses. An area of high recreation impact is not an administrative unit such as a National Forest, BLM Field Office, or Reclamation Project. In addition, it is contiguous areas directly associated with a clearly identified special, natural, or cultural features, place or activity that is the focal point of recreation use and have clearly defined access points and clearly described area boundaries.

Typically, a high impact recreation area is comprised of a complex of individual sites and displays one or more of the following characteristics:

(1) Has a population of one million or more within two hours of driving time;
(2) Contains rivers, streams, lakes or interpreted scenic byways corridors;
(3) Designed and conducted to maintain or enhance the recreational opportunities through Natural Resource Management Activities;
(4) Has regionally or nationally recognized recreation resources; and
(5) Is regionally or locally marketed for its tourism value.

RECREATION EXPERIENCES. Psychological outcomes realized either by recreation-tourism participants as a direct result of their onsite leisure engagements and recreation-tourism activity participation or by non-participating community residents as a result of their interaction with visitors and guests within their community and/or interaction with the BLM and other public and private recreation-tourism providers and their actions.

RECREATION OPPORTUNITIES. Favorable circumstances enabling visitors' engagement in a leisure activity to realize immediate psychological experiences and attain more lasting, value-added beneficial outcomes.

RECREATION-TOURISM MARKET. Recreation-tourism visitors, affected community residents, affecting local governments and private sector businesses, or other constituents and the communities or other places where these customers originate (local, regional, national, or international). Based on analysis of supply and demand, land use plans strategically identify primary recreation-tourism markets for each SRMA—destination, community, or undeveloped.

RECREATION OPPORTUNITY SPECTRUM (ROS). A continuum used to characterize recreation opportunities in terms of setting, activity, and experience opportunities. Six classes are included: primitive (P), semiprimitive nonmotorized (SPNM), semi-primitive motorized (SPM), roaded natural (RN), rural (R), and modern urban (U). Refer to the individual definitions in this glossary.

RELATED WATERS. Waters that lie directly over or adjacent to public lands and require some management control to protect federally administered resources or to provide for enhanced visitor safety.

RESERVATION. A withdrawal of a permanent nature, dedicated to a specific public purpose.

RESOURCE MANAGEMENT PLAN (RMP). A written land use plan that outlines BLM's decisions and strategies for management of the resources in a particular area. The RMP has been used by the BLM since 1980.

RESTRICTED AREAS. Areas where mitigation such as seasonal restrictions is required to protect resource values.

ROADED NATURAL (RN). Areas with about equal recreation opportunities for affiliation with other user groups and for isolation from sights and sounds of humans. Involves the opportunity to have a high degree of interaction with the natural environmental. Challenge and risk opportunities are not very important except in specific challenging activities. The practice of outdoor skills may be important. Opportunities for both motorized and nonmotorized recreation are present. One of the six classes of the Recreation Opportunity Spectrum (ROS).

RURAL (R). Areas with recreation opportunities to experience affiliation with individuals and groups are prevalent as is the convenience of sites and opportunities. These factors are generally more important than the natural setting. Opportunities for wild land challenges, risk taking, and testing of outdoor skills are unimportant, except in activities involving challenge and risk. One of the six classes of the Recreation Opportunity Spectrum (ROS).

SCOPING PROCESS. An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. Scoping may involve public meetings, field interviews with representatives of agencies and interest groups, discussions with resource specialists and managers, written comments in response to news release, direct mailings and articles about the proposed action, and scoping meetings.

SUITABLE HABITAT. Unless previously defined for a particular species, areas that contain or exhibit the components necessary to support a target species' persistence, wholly or in part of its lifecycle or range, regardless of documented species' presence.

RIGHT-OF-WAY (ROW). The legal right for use, occupancy, or access across land or water areas for a specified purpose or purposes. Also, the lands covered by such a right. Examples are roads, power lines, pipelines, water wells, and communication sites. It does not grant an estate of any kind.

RIPARIAN AREAS. Riparian areas are a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.

RIPARIAN AREA. A riparian area is an area of land occurring adjacent to streams, rivers, and other water bodies that is directly influenced by water. A riparian community is characterized by certain types of vegetation, soils, hydrology, and fauna and requires free or unbound water or conditions more moist than normally found in the area. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent on free water in the soil.

Saleable (or salable) minerals. See mineral materials.

SEDIMENT YIELD. A quantitative measure of the total sediment outflow from a watershed over a given period of time at a specified point in the channel. Sediment yield is the difference between the total erosion from slopes, channels, and mass wasting, and the amount of sediment deposited before reaching the specified point in the channel.

SEEPS. Is where ground water percolates to the surface and forms a saturated area.

SELF-SUSTAINING POPULATION. A population that survives at, or increases beyond, what is assessed to be a viable stable level in a natural state in the wild.

SEMI-PRIMITIVE MOTORIZED (SPM). Areas with some recreation opportunity for isolation from the sights and sounds of humans, but not as important as for primitive opportunities. Involves the opportunity to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Provides an explicit opportunity to use motorized equipment while in the area. One of the six classes of the Recreation Opportunity Spectrum (ROS).

SEMI-PRIMITIVE NON-MOTORIZED (SPNM). Areas with some recreation opportunity for isolation from the sights and sounds of humans, but not as important as for primitive opportunities. Involves the opportunity to have a high degree of interaction with the natural environmental, to have moderate challenge and risk, and to use outdoor skills. One of the six classes of the Recreation Opportunity Spectrum (ROS).

SIGNIFICANT CAVE. A cave located on federal lands that possesses one or more of the following features, characteristics, or values (1) Biota; (2) Cultural; (3) Geologic/Mineralogic/Paleontologic; (4) Hydrologic; (5) Recreational; (6) Educational or Scientific.

SIGNIFICANT KARST. An area in which sinkholes or other features, such as lineaments, provide points of recharge to an aquifer that is the source of water for human, livestock, or wildlife use, or which provides a primary recharge zone for cave-related hydrologic systems.

SINKHOLE. A closed depression formed when the ground surface collapses above voids created by the solution of carbonate or evaporate rocks. Water levels typically fluctuate rapidly in sinkholes because of their close connection to groundwater.

SITES. An area, such as a mountaintop, where a holder locates one or more communication or other right-of-way facilities.

SLOPE. The inclination of the land surface to the horizontal. When expressed as a percent, slope equals the change in elevation divided by the horizontal distance, with the result multiplied by 100 percent. Thus, a slope of 20 percent is a change in elevation of 20 feet for every 100 feet horizontally.

SPECIAL AREAS. Designated by statute, Executive, or Secretarial order, State Director special rule making authority, or an area covered by joint agreement between the BLM and a state under Title II of the Sikes Act (16 United States Code 670a et seq.).

SPECIAL HABITAT FEATURE. A specific component of a habitat site requiring individual consideration, including geological anomalies (cliffs), aquatic situations (seeps), or human-made structures (windmill). A feature may be present in the habitat site because of animal use (booming grounds). Special habitat features may affect wildlife positively or negatively.

SPECIAL MANAGEMENT AREAS. An area containing one or a combination of unique resources or values that receive more intensive management (e.g., ACECs, Wilderness Study Areas [WSAs], and SRMAs).

SPECIAL RECREATION MANAGEMENT AREA (SRMA). Areas requiring explicit recreation management to achieve BLM's recreation objectives and to provide specific recreation opportunities. SRMAs are listed in this plan, which also define SRMA management objectives. The BLM's recreation investments are concentrated in these areas.

SPECIAL RECREATION PERMIT. An authorization that allows specified recreational uses of the public lands and related waters. Special Recreation Permits are issued as a means to manage visitor use, protect natural and cultural resources, and as a mechanism to authorize commercial, competitive, and vending use; organized group activities and events; and individual or group use of special areas.

SPECIAL STATUS SPECIES. Wildlife and plant species either federally listed or proposed for listing (candidates) as endangered or threatened, state-listed species, or BLM determined priority species (sensitive species).

SPRING. Where water is discharged from a fixed point and the flow usually forms a small channel.

SOLID LEASABLE MINERALS. The chlorides, sulfates, carbonates, borates, silicates or nitrates of potassium or sodium and related products; sulphur in the States of Louisiana and New Mexico and on all acquired lands; phosphate, including associated and related minerals; asphalt in certain lands in Oklahoma; and gilsonite (including all vein-type solid hydrocarbons).

STATE APPROPRIATIVE WATER RIGHT. A water right licensed by the New Mexico State Engineer once proof of beneficial use is established.

STATE HISTORIC PRESERVATION OFFICER (SHPO). A position within state governments responsible for coordinating State participation in the implementation of the National Historic Preservation Act. This officer serves as an assistant and consultant when identifying cultural properties, assessing effects to them, and considering alternatives to avoid or reduce those effects.

STIPULATION. A requirement, usually dealing with protection of the environment that is made a part of a lease, grant, or other authorizing document. In the case of oil and gas leases, a provision that modifies standard lease rights and is attached to and made a part of the lease. Also, refer to "CONDITION OF APPROVAL (COA)" in the Glossary. The following represent the major stipulations on BLM land:

> **No Surface Occupancy Stipulation (NSO):** A stipulation in which use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values.
>
> **Timing Limitation Stipulation:** A stipulation that prohibits surface use during specified time periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project specific mitigation measures would be insufficient.
>
> **Controlled Surface Use Stipulation (CSU):** A stipulation in which use and occupancy is allowed (unless restricted by another stipulation), but identified resources values require special operational constraints that may modify the lease rights.

STRUTTING GROUND. Synonymous with lek.

SUITABILITY. The adaptability of an area to grazing by livestock or wildlife.

SUITABLE LESSER PRAIRIE-CHICKEN HABITAT. Unoccupied areas of appropriate vegetation type, in patches of 320 acres or more falling entirely outside of Robel impact/avoidance distances around infrastructure.

SUITABLE RANGE. Rangeland that is accessible to livestock that can be grazed on a sustained yield basis without damaging the resource.

SURFACE DISTURBANCE. Any action that removal of soil or vegetation and expose the mineral soil to erosive processes. Used in the literal context of actual, physical disturbance and movement or removal of the land surface and vegetation.

SURFACE USE PLAN OF OPERATIONS (SUPO). The purpose of a SUPO is to manage development so that impacts to special status species habitat are minimized or eliminated. A SUPO would incorporate applicable best management practices and disclose all future well locations; the location and arrangement of well infrastructure (e.g., tank batteries, compressors, power lines and poles); road locations; and rights-of-way. SUPOs contain proprietary information and therefore are not subject to disclosure under the Freedom of Information Act.

SURFACE WATER. All water located at the surface of the land, such as streams, rivers, and lakes.

THREATENED SPECIES (Federal). Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Whether a species is threatened or endangered is determined by the following factors: (1) present or threatened destruction, modification, or curtailment of its habitat or range; (2) over utilization for commercial, sporting, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors. Also, see "Endangered Species (Federal)" in the Glossary.

THREATENED SPECIES (State). Any species or subspecies that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in New Mexico. Also, see "Endangered Species (State)" in the Glossary.

TRAVEL MANAGEMENT AREAS. Polygons or delineated areas where a rational approach has been taken to classify areas open, closed, or limited, and have identified and/or designated network of roads, trails, ways, and other routes that provide for public access and travel across the planning area. All designated travel routes within travel management areas should have a clearly identified need and purpose as well as clearly defined activity types, modes of travel, and seasons or timeframes for allowable access or other limitations.

TURBIDITY. A condition in water caused by the presence of suspended matter that results in the scattering and absorption of light. Generally, a measure of fine suspended matter in water.

UNDEVELOPED RECREATION-TOURISM MARKET. National, regional, and/or local recreation-tourism visitors, communities, or other constituents who value public lands for the distinctive kinds of dispersed recreation produced by the vast size and largely open, undeveloped character of their recreation settings. Major investments in facilities are excluded within SRMAs where the BLM's strategy is to target demonstrated undeveloped recreation-tourism market demand. Here, recreation management actions are geared toward meeting primary recreation-tourism market demand to sustain distinctive recreation setting characteristics; however, major investments in visitor services are authorized both to sustain those distinctive setting characteristics and to maintain visitor freedom to choose where to go and what to do—all in response to demonstrated demand for undeveloped recreation.

UNITIZATION. The joint development of an oil field that includes territory controlled by different owners. A unitized field allows participants to share both royalties and risks in the development of the field and to utilize the field's natural features without damaging the field through excessive competition.

UNSUITABLE LESSER PRAIRIE-CHICKEN HABITAT. Areas outside appropriate vegetation. This may include urban and agricultural areas, areas where shinnery oak is naturally not present or has been eliminated by chemical treatment, and other areas where natural vegetation has been greatly altered or degraded.

USE OF WILDLAND FIRE. Either wildland fire use or prescribed fire applications to meet resource objectives.

VALUE. As used in the RMP/EIS, a value refers to a natural resource or characteristic of a natural resource that is not usually a commodity or is difficult to quantify in terms of a unit of measurement. Examples of values in this context are listed in FLPMA and include scientific, scenic, air and atmospheric, historical, archeological and ecological resources.

VEGETATION TREATMENTS. Methods used to manage the growth and spread of vegetation. A vegetative management practice can either be a direct management of the vegetation itself, for example prescribed fire or indirect management like a change in the number of livestock utilizing the vegetation, or a change in the time frames when livestock are utilizing the vegetation.

VISUAL RESOURCES MANAGEMENT (VRM). The inventory and planning actions taken to identify visual values and to establish objectives for managing those values; and the management actions taken to achieve the visual management objectives.

VISUAL RESOURCE MANAGEMENT (VRM) CLASSES. VRM classes are based on relative visual ratings of inventoried lands. Each class describes the different degree of modification allowed to the basic elements of the landscape. The following are the minimum management objective for each class.

Class 1: Natural ecological changes and very limited management activity are allowed. Any contrast created within the characteristic landscape must not attract attention. This classification is applied to visual ACECs, wilderness areas, wild and scenic rivers, and other similar situations.

Class II: Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the landscape. A contrast may be seen but should not attract attention.

Class III: Contrasts to the basic elements caused by a management activity may be evident and begin to attract attention in the landscape. The changes, however, should remain subordinate in the existing landscape.

Class IV: Contrasts may attract attention and be a dominant feature in the landscape in terms of scale. However, the changes should repeat the basic elements of the landscape.

Rehabilitation Area: Change is needed or change may add acceptable visual variety to an area. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding landscape. This class would apply to areas identified in the scenic evaluation where the quality class has been reduced because of unacceptable cultural modification. The contrast is inharmonious with the characteristic landscape. It may also be applied to areas that have the potential for enhancement; i.e., add acceptable visual variety to an area or site. It should be considered an interim or short term classification until one of the other VRM class objectives can be reached through rehabilitation or enhancement. The desired visual resource management class should be identified.

WAIVER. Permanent exemption from a lease stipulation. The stipulation no longer applies anywhere within the leasehold.

WATER QUALITY STANDARD. Regulations that specify designated uses for surface waters of the state, and water quality criteria to protect those uses. Standards are specified by the Water Quality Control Commission, in accordance with Section 303 of the Clean Water Act.

WETLANDS. Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and that, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, shallows, swamps, lake shores, bogs, muskegs, wet meadows, estuaries, and riparian areas.

WILDERNESS. The definition contained in Section 2(c) of the Wilderness Act of 1964 is as follows: “A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.” Wilderness is an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features or scientific, educational, scenic, or historical value.

WILDERNESS AREA. An area formally designated by Congress as part of the National Wilderness Preservation System.

WILDERNESS STUDY AREA (WSA). A roadless area that has been found to have wilderness characteristics.

WILDERNESS CHARACTERISTICS. Those characteristics of wilderness as described in Section 2(c) of the Wilderness Act. These include size, naturalness, solitude, primitive and unconfined type of recreation, and supplemental values.

WILDFIRE. An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

WILDFIRE SUPPRESSION. An appropriate management response to wildfire, escaped wildland fire use or prescribed fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire.

WILDLAND FIRE. Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire.

WILDLAND FIRE USE. The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in predefined designated areas outlined in Fire Management Plans.

WILDLIFE. Includes all species of animals, birds, mammals, mollusks, crustaceans, amphibians, fish, insects, reptiles, or their progeny or eggs that, whether raised in captivity or not, are normally found in a wild state. Feral horses and burros are excluded.

WITHDRAWAL. Removal or withholding of public land, by statute or secretarial order, from operation of some or all of the public land laws. A mineral withdrawal is the closing of an area to mineral location and development activities. A mineral withdrawal includes public lands potentially valuable for solid leasable minerals, precluding the disposal of the lands except with a mineral reservation clause unless the lands are found not to contain a valuable deposit of minerals.

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INTRODUCTION

The U.S. Department of the Interior (USDI) is the steward and manager of America's natural resources, including oil, gas, coal, hydropower, and renewable energy resources. The USDI manages lands, subsurface rights, and offshore areas that produce approximately 19% of the nation's energy. Energy development on public lands increases domestic energy production, provides alternatives to overseas energy resources, creates jobs, and enhances the nation's energy security. The Office of Natural Resources Revenue (ONRR) collects an average of over $10 billion in annual revenue from onshore and offshore energy production, one of the federal government's largest sources of non-tax revenue.

The Bureau of Land Management (BLM) Carlsbad Field Office (CFO) has prepared this Draft Resource Management Plan and Environmental Impact Statement (Draft RMP/EIS) to provide potential direction for managing public lands within the CFO planning area and to analyze the environmental effects of the proposed actions.

The Draft RMP/EIS, once approved, will replace the Carlsbad Resource Management Plan (RMP), which was signed in 1988 and amended in 1997 and 2008 (BLM 1988). The Draft RMP/EIS covers the same area as that covered by the 1988 RMP as amended, which is all of Lea and Eddy Counties and the "bootheel" or southwest portion of Chaves County. The Carlsbad planning area comprises approximately 6,260,000 acres of land, of which BLM administers approximately 2,090,000 acres of public land and 2,744,000 acres of subsurface federal mineral estate of some of the most prodigious oil and natural gas minerals in the United States.

The public lands and federal mineral estate managed by the CFO possess unique geology containing prodigious oil and natural gas reserves in the Delaware Basin, which includes the Wolfcamp Shale Formation. The planning area is mostly rural in nature, is primarily a desert landscape, and includes parts of three ecoregions, the Chihuahuan Desert, Arizona/New Mexico Mountains, and High Plains. The terrain consists mostly of basins broken up by small mountain ranges. The planning area ranges in elevation from 866 to 7,487 feet above mean sea level. The lowest point in the state of New Mexico is located on the Red Bluff Reservoir in Eddy County, where the impounded Pecos River flows out of New Mexico into Texas. The highest point in the planning area is Dog Canyon Rim in the Guadalupe Escarpment. The planning area also includes the Delaware, Pecos, and Black Rivers.

BLM land within this planning effort will support guidance outlined in Executive Order 13790 Promoting Agriculture and Rural Prosperity in America by using public lands in the planning area to foster jobs and the rural community associated with oil and gas development, other mineral development (e.g., potash, sodium), livestock grazing, and recreation. The preferred alternative projects 14,668 direct/indirect jobs in the next 10 years and 15,573 direct/indirect jobs in the next 20 years, improving existing conditions by adding 1,584 total jobs in the next 10 years and 2,489 in the next 20 years.

The Draft RMP/EIS was prepared using the BLM's planning regulations and guidance issued under the authority of the Federal Land Policy and Management Act (FLPMA) of 1976. An Environmental Impact Statement (EIS) is incorporated into this document to meet the requirements of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations for implementing NEPA (40 Code of Federal Regulations 1500–1508), and requirements of the BLM's NEPA Handbook 1790-1 (BLM 2008).

PURPOSE AND NEED

Purpose

The purpose of the Draft RMP/EIS is to provide guidance for managing the use of BLM-administered lands and a comprehensive management framework for future land management actions in the CFO planning area. The BLM is tasked with allocating resources and resource uses pursuant to FLPMA's multiple use and sustained yield mandate. In addition, the purposes of this plan are as follows:

- Consolidate the existing land use plan and amendments into a complete RMP/EIS.
- Re-evaluate, with public involvement, existing conditions, resources, and uses, and reconsider the mix of resource allocations and management decisions designated to balance uses and the protection of resources pursuant to FLPMA and applicable laws.
- Resolve multiple-use conflicts or issues between resource values and resource uses.
- Maintain or improve ecosystem functions.
- Promote diversity and resilience of biological resources, including special status species.
- Preserve important cultural, historical, and physical resources as well as tribal rights and interests.
- Provide opportunities for sustainable uses of public lands.

Need

A revision to the 1988 RMP is necessary because a number of changes have occurred in the CFO planning area since its publication. New resource issues have emerged, new resource data are available for consideration, and new policies, guidelines, and laws have been established. These changes are outlined in the *Carlsbad Resource Management Plan and the Carlsbad Resource Management Plan Amendment. RMP Evaluation Report* (BLM 2010a). The changes are in part due to continuing fluid and solid mineral extraction and energy developments in the area and new technologies being used to extract those resources. Concurrent extraction of both fluid and solid mineral reserves presents a new management challenge not addressed adequately in the 1988 RMP and its amendments.

There is also a need to update the RMP to address several interrelated issues and management concerns, including renewable energy, recreation, special status species, visual resources, cultural resources, and wildlife habitat. Special designations, such as Areas of Critical Environmental Concern (ACECs), need to be considered for designation to address concerns in resource sensitive areas. The BLM must evaluate situations where development of commercial energy and mineral resources or high-value recreation resources may be impacted by the management prescription being considered for the protection of the R&I values identified for potential ACECs. Management prescriptions for potential ACEC designation that could limit development of 1) commercial coal, oil, gas, solar, wind, or geothermal resources; or 2) recreation or other resources important primarily for their economic benefit to the planning area must be evaluated to avoid unnecessarily restricting these activities. The boundaries of the ACEC designation should be defined as the smallest area necessary to protect those R&I values and minimize impacts to other uses.

Planning Issues

Chapter 1 provides a description of the planning issues and sub-issues identified during the Draft RMP/EIS process and development. The primary issues are as follows:

- Minerals development
- Renewable energy and lands and realty
- Special designations
- Watershed management
- Recreation and travel management

ALTERNATIVES

No Action Alternative

The No Action Alternative would be a continuation of existing management under the 1988 RMP and its amendments (BLM 1988).

Alternative A

Alternative A has been developed to address watershed management and restoration-related planning issues. This alternative would allow development in existing leased/developed areas but would use restoration as a tool to avoid the net loss of natural resources. This alternative focuses on the restoration of previous surface disturbance before new disturbance occurs. High-quality habitat areas would be prioritized for no net loss. Possible restoration focus areas include dunes sagebrush lizard (*Sceloporus arenicolus*) and lesser prairie-chicken (*Tympanuchus pallidicinctus*) habitat. Under this alternative certain reclamation measures would be required in certain areas (i.e., priority restoration areas) to enhance overall restoration of the area. The amount of available forage for livestock grazing would be moderately reduced under this alternative. Also, there may be more widespread treatment of noxious weeds and/or more restoration-related vegetation treatments. Alternatively, these efforts may be focused on priority restoration areas based on a set of criteria. Acres available for livestock grazing may be reduced under this alternative with an emphasis on reducing livestock grazing in priority restoration areas. Acres available for leasable mineral development may also be reduced, particularly in priority restoration areas. Under this alternative Visual Resource Management (VRM) designations may tend more toward VRM Class I, II, and III.

Alternative B

Alternative B has been developed to address resource user or resource use conflicts related to leasable mineral development, recreation, and watershed management. This theme would address the resource user or resource use conflicts by geographically separating conflicting uses to the extent possible. This alternative would include resource focus areas where certain resource users/uses are prioritized over other resource users/uses occurring in the same general area. This alternative would also focus on maintaining the existing nature of undeveloped areas (for non-motorized recreation or wildlife uses, for example) and concentrating development in areas where development is already substantially present (for example, in areas of existing oil and gas development or where motorized recreation is concentrated). This alternative would focus on maintaining the existing nature of undeveloped key or unique areas or habitats (gypsum soil areas, undisturbed cave/karst areas, shinnery oak [*Quercus havardii*] habitat, dunes sagebrush lizard habitat, etc.). Additionally, key areas for human use would be “protected” to the extent possible by allowing relatively unfettered access and exclusion of competing uses (e.g., Hackberry Lake Off-highway Vehicle [OHV] Area use).

Alternative C (Preferred Alternative)

Alternative C has been preliminarily identified as the Preferred Alternative, which is the alternative that best meets the purpose and need of the Draft RMP/EIS and best addresses the key planning issues while providing for a balanced approach of protection and preservation of natural resources, while providing for commodity production and extraction.

Alternative C would rely on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas. Competing uses and resource values would continue to occur in the same areas. For example, this alternative theme would rely on timing limitations and Controlled Surface Use (CSU) stipulations for mineral development rather than closing areas to mineral development or requiring No Surface Occupancy (NSO). Another example would be permitting recreational use with accompanying required practices for users instead of closing areas to recreational access or confining that use to a specific area. This alternative would allow the decision maker to determine if it is possible to manage conflict and allow true multiple use without geographically separating “conflicting” uses.

Alternative D

This theme is primarily intended to address leasable mineral development, lands and realty, and recreation issues. This alternative would manage resources and resource uses within the mandates of existing laws and regulations without additional restrictions. This alternative may focus on maximizing leasable mineral development and other commercial uses of the land (such as rights-of-way [ROWs] for wind and solar development and livestock grazing), while at the same time maximizing motorized and non-motorized recreation opportunities. This alternative may include focus areas where the viability of commercial activities would be prioritized over most other resource users/uses. Under this alternative, more areas may be open to leasable mineral development, perhaps with fewer stipulations. Likewise, fewer areas may be closed to motorized recreation or other recreation uses. Under this alternative, VRM designations may tend more toward VRM Class III and IV. Acres available for livestock grazing would be greater than under the other alternatives.

Differences among Alternatives

Table ES-1 presents a summary of allocation decisions by alternative, and compares allocation acreages for travel management, visual resource management, grazing, minerals, renewable energy, land use, land use authorizations, recreation, and special designations. Also included are the acreage of lands managed to protect their wilderness characteristics.

Table ES-1. Comparison of Allocations across Alternatives

(All allocations are shown in acres.)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Livestock Grazing Allocations					
Available	2,086,103	1,598,198	1,937,725	2,083,232	2,087,759
Unavailable	5,226	493,120	153,583	8,115	3,594
Visual Resource Management Class Allocations					
VRM Class I	7,058	37,764	42,102	7,171	7,171
VRM Class II	43,613	235,946	315,700	60,791	41,092
VRM Class III	402,725	367,205	294,177	549,329	546,205
VRM Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Special Designation Allocations					
Areas of Critical Environmental Concern	13,435	495,041	561,433	98,562	28,894
Lands with Wilderness Characteristics (11 inventory units: 66,666 acres met criteria)					
Managed to protect wilderness characteristics	0	66,666	47,611	5,119	1,220
Managed to emphasize other multiple uses while applying management restrictions	0	0	0	30,596	0
Managed to emphasize other multiple uses as a priority over protecting wilderness characteristics (I.e. manage to emphasize and allow for mineral and renewable development, land use authorizations, livestock grazing and recreation, among other uses as a priority over protecting wilderness characteristics.)	0	0	19,055	30,951	65,446

(All allocations are shown in acres.)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Mineral Resource Allocations					
Leasable					
Open	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Open with Controlled Surface Use (CSU)	956,410	799,649	449,759	786,381	631,634
Open with No Surface Occupancy (NSO)	54,602	80,394	162,013	158,401	70,142
Closed	174,391	761,404	1,082,972	88,502	84,687
Salable					
Open	2,637,465	1,160,064	1,121,118	1,784,431	2,028,324
Open with Special Terms and Conditions	–	1,062,192	726,270	752,286	602,621
Closed	146,568	561,995	936,799	247,323	153,174
Locatable					
Open	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
Recommended for Withdrawal	32,374	380,990	673,996	132,249	122,444
Renewable Energy Allocations					
Geo – Open	964,322	1,788,890	1,411,281	2,175,070	2,319,907
Geo – Close	1,819,929	995,285	1,372,791	608,850	464,187
Wind – Avoid	949,539	624,734	418,812	883,051	926,749
Wind – Open	1,134,948	800,762	760,560	1,002,986	1,092,311
Wind – Exclude	7,056	666,783	912,860	206,184	73,143
Solar – Exclude	1,820,409	768,020	833,305	734,636	630,302
Solar – Variance	271,316	1,323,157	1,257,870	1,356,451	1,460,801
Land Tenure					
Disposal	218,318	18,703	26,125	31,123	51,579
Retention	1,872,747	2,070,580	2,063,155	2,058,155	2,037,362
Land Use Authorization Allocations					
Open to ROW	2,051,927	798,544	757,380	1,610,692	1,749,782
Avoid ROW	30,965	629,149	413,654	313,619	270,360
Excluded to ROW	7,056	662,038	918,701	165,378	69,540
Recreation Management Areas					
Extensive Recreation Management Areas	–	2,975	26,564	17,302	9,456
Special Recreation Management Areas	68,194	49,991	49,988	49,669	49,673
Travel Management Designations					
OHV Limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737

ENVIRONMENTAL CONSEQUENCES

A detailed summary of the environmental consequences projected to result from implementation of each alternative is included in Chapter 2, Summary of Impacts. The full and complete analysis of impacts to each resource and resource use, by alternative, is provided in Chapter 4, Environmental Consequences. Context and intensity of impacts are provided through a comparison of the alternatives with existing conditions (as identified in Chapter 3, Affected Environment and the No Action Alternative).

The primary impact to the landscape and associated resources and resource uses analyzed in the RMP would be from future proposed mineral development including oil and gas development and mining. Therefore, the biggest differences in impacts from the range of alternatives can be derived from looking at the proposed allocations for minerals cited above in Table ES-1. Based on this high-level view, Table ES-2 provides a brief description of the biggest difference in impacts between the alternatives.

Table ES-2. High-level Summary of Impacts by Alternative

No Action Alternative	The No Action alternative provides the least constraints on where minerals may be developed, and allows for the most acres allocated to potential development, carrying forward the management from the 1988 RMP and its amendments (BLM 1988). The 1988 RMP and its amendments allocated the fewest acres into special designation areas with their associated constraints on development. Therefore, the No Action alternative would have the greatest impact on physical and biological resources**,** including sensitive vegetation and soil types, and wildlife habitats.
Alternative A	Alternative A is the most restrictive alternative on development next to Alternative B. Alternative A proposes constraints on where minerals may be developed through acres allocated as special designation areas and no surface occupancy, and it allows for fewer acres available for future potential development than the No Action alternative and Alternatives C and D. Next to Alternative B, Alternative A would have the least impact on physical and biological resources, although it would also have the potential for adverse impacts to mineral extraction–dependent businesses.
Alternative B	Alternative B is similar to Alternative A, but proposes even greater constraints on mineral development and fewer acres available for future potential development. Similarly, this alternative allocates the most acres into special designation areas with their associated resource protections and constraints on development. Therefore, Alternative B would have the least potential to adversely impact physical and biological resources and would protect a variety of vegetation and soil types and wildlife habitats. Alternative B would have the potential for adverse impacts to businesses that depend on public land for resource extraction.
Alternative C	Alternative C proposes constraints on where mineral development could occur to a greater degree than the No Action alternative, but does not limit development or propose adoption of as many special designation acres to the same degree as Alternative A and B. Impacts to physical and biological resources would continue to occur, though some areas not closed to development under the No Action alternative would be closed under Alternative C. Alternative C would allow for many uses to continue, but would constrain certain activities to maintain or protect important natural resources. Alternative C could result in some short-term adverse impacts to resource extraction businesses, in comparison to the No Action alternative, but long-term economic benefits would be gained from the emphasis on a diversity of public lands uses.
Alternative D	Alternative D is most similar to Alternative C, though it proposes fewer constraints and limits on development than Alternative C. Resource extraction uses would generally be least encumbered by management decisions under this alternative. Alternative D offers the greatest potential benefits to the local economy from resource extraction. Acres allocated as special designation areas are fewer than all of the other action alternatives, and as a result, Alternative D would result in greater impacts on the physical and biological environment.

CONSULTATION AND COORDINATION

Chapter 5 describes the consultation and coordination efforts by the CFO throughout the planning process. Public involvement has been an integral part of BLM's RMP effort. The scoping period for the Carlsbad RMP began on June 10, 2010, and ended on September 10, 2010. Comments obtained from the public during the scoping period were used to define the relevant issues that would be resolved by presenting a broad range of alternative management actions.

The CFO hosted 10 public scoping meetings where the public was encouraged to submit oral or written comments regarding management of BLM-administered lands in the planning area. In addition to the 10 scoping meetings, multiple public workshops were held during the development of the Preliminary RMP/DEIS to inform the public of the planning status and to obtain comments from the public. Two social and economic workshops were held on November 15 and 16, 2011, in Carlsbad and Hobbs respectively, to discuss the issues related to the local economies and social conditions of the counties, towns, and cities in the planning area and the role public lands serve in those economies. On January 18, 2012, the CFO presented to the Pecos District Resource Advisory Council. Four public workshops were held on February 1 and 2, 2012, to discuss the potential management alternatives for special designations, visually sensitive areas, and BLM transportation routes within the planning area. Four public workshops were held on July 8 and 9, 2014, to discuss lands with wilderness characteristics, including the BLM's policy for these lands and the results of the inventory conducted for the RMP.

Other public meetings where the RMP was presented and discussed include the following:

- Multiple use interface with ranching community, oil and gas and potash industry (Carlsbad, May 4, 2011)
- Public Lands Advisory Council (Roswell, February 9, 2012)

To date, the CFO has consulted with the U.S. Fish and Wildlife Service (USFWS) informally regarding the RMP process. The USFWS has an employee embedded in the CFO to assist with issues involving federally listed species. Although not a formal cooperating agency, the USFWS was represented at the alternatives development workshop with cooperating agencies on November 13 and 14, 2014.

The BLM is also conducting government-to-government coordination and consultation with seven federally-recognized Native American tribes: Mescalero Apache Tribe, Apache Tribe of Oklahoma, Comanche Indian Tribe, Pueblo of Isleta, Kiowa Tribe of Oklahoma, Ysleta del Sur Pueblo, and Hopi Tribal Council.

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1.1 PURPOSE AND NEED FOR THE PLAN

1.1.1 Introduction

The Federal Land Policy and Management Act (FLPMA) of 1976 directs the Bureau of Land Management (BLM) to develop and periodically update its land use plans, which guide the BLM principles of multiple use and sustained yield on public lands. The Carlsbad Field Office (CFO) began revising its land use plan, the 1988 *Carlsbad Resource Management Plan* (1988 RMP; BLM 1988), as amended, in 2009. The 1997 *Carlsbad Approved Resource Management Plan Amendment and Record of Decision* (1997 RMP Amendment; BLM 1997) replaced management actions related to oil and gas management. The 2008 *Special Status Species Resource Management Plan Amendment and Record of Decision* (Special Status Species RMP Amendment; BLM 2008a) amended decisions from the 1988 and 1997 plans concerning oil and gas and other mineral development, as well as land ownership adjustments, while maintaining and enhancing habitat for the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and dunes sagebrush lizard (*Sceloporus arenicolus*). The *Carlsbad Draft Resource Management Plan Revision and Environmental Impact Statement* (Draft RMP/EIS) provides proposed future management direction for public lands within the boundaries of the BLM CFO.

The National Environmental Policy Act (NEPA) of 1969 requires that an EIS be prepared for any federal action that may significantly affect the quality of the human environment. In this Draft RMP/EIS, BLM staff members on an interdisciplinary (ID) team present and analyze the impacts of alternative ways of managing public lands, resources, and resource uses under the jurisdiction of the BLM CFO.

1.1.1.1 Overall Vision for the Carlsbad Field Office

Lying in the southeast corner of New Mexico in the Chihuahuan Desert, the CFO planning area is unique, containing abundant mineral resources, vast cultural resources, and diverse landscapes. The public lands managed by the CFO support a variety of ecosystems rich in biodiversity and include unique and prodigious geology containing abundant oil and natural gas not found anywhere else in the United States. Surface needs for development of resources place indirect demands on sensitive desert aquifers, making it incumbent on the BLM to look ahead toward incorporating technology and best management practices (BMPs) that could ease the stresses on freshwater aquifers. Current development trends for mineral resources have also created numerous opportunities for the CFO in terms of landscape restoration and cultural resource investigations. These lands and associated resources are vital to the economic stability and sustainability of present and future generations; therefore, the CFO will look to maintain long-term sustainability of all resources in the planning area, in compliance with FLPMA, while concurrently allowing responsible mineral development and recreational use to benefit the local and state economies.

1.1.2 Purpose and Need for the Plan

1.1.2.1 Purpose

The purpose of the Draft RMP/EIS is to provide guidance for managing the use of BLM-administered lands and a comprehensive management framework for future land management actions in the CFO planning area. The BLM is tasked with allocating resources and resource uses pursuant to FLPMA's multiple-use and sustained-yield mandates.

In addition, the purposes of this plan are as follows:

- Consolidate the existing land use plan and amendments into a complete RMP/EIS.
- Re-evaluate, with public involvement, existing conditions, resources and uses, and reconsider the mix of resource allocations and management decisions designated to balance uses and the protection of resources pursuant to FLPMA and applicable laws.
- Resolve multiple-use conflicts or issues between resource values and resource uses.
- Maintain or improve ecosystem functions.
- Promote diversity and resilience of biological resources, including special status species.
- Preserve important cultural, historical, and physical resources, as well as tribal rights and interests.

- Provide opportunities for sustainable uses of public lands.

This plan also provides for energy independence by encouraging environmentally responsible development and facilitates shared conservation stewardship and increased recreational opportunities throughout the CFO planning area.

1.1.2.2 Need

A revision to the 1988 RMP is necessary because a number of changes have occurred in the CFO planning area since its publication. New resource issues have emerged; new resource data are available for consideration; and new policies, guidelines, and laws have been established. These changes are outlined in the *Carlsbad Resource Management Plan and the Carlsbad Resource Management Plan Amendment. RMP Evaluation Report* (BLM 2010a). The changes are in part due to continuing fluid and solid mineral extraction and energy developments in the area and new technologies being used to extract those resources. Concurrent extraction of both fluid and solid mineral reserves presents a management challenge not addressed adequately in the 1988 RMP and its amendments.

There is also a need to update the RMP to address several interrelated issues and management concerns, including renewable energy, recreation, special status species, visual resources, cultural resources, and wildlife habitat. Special designations such as Areas of Critical Environmental Concern (ACECs) need to be considered for designation to address concerns in resource sensitive areas. The BLM must evaluate situations where development of commercial energy and mineral resources or high-value recreation resources may be impacted by the management prescription being considered for the protection of the relevant and important values identified for potential ACEC. Management prescriptions for potential ACEC designation that could limit development of 1) commercial coal, oil, gas, solar, wind, or geothermal resources, or 2) recreation or other resources important primarily for their economic benefit to the planning area must be evaluated to avoid unnecessarily restricting these activities. The boundaries of the ACEC designation should be defined as the smallest area necessary to protect those relevant and important values and minimize impacts to other uses. The RMP will support guidance outlined in Executive Order 13790 Promoting Agriculture and Rural Prosperity in America by using public lands in the planning area to foster jobs and the rural community associated with oil and gas development, other mineral development (e.g., potash, sodium), livestock grazing, and recreation. There are opportunities to update recreation decisions in the plan revision to capitalize on community interests and needs, as well as surrounding tourism destinations. Most of the lands administered by the CFO are currently designated as open to cross-country, motorized vehicle use, a designation that needs to be re-examined to balance resource protection with travel management needs. Visual resources need to be inventoried and visual resource management (VRM) designations need to be updated to address renewable energy demand, as well as other potential uses in the planning area. In addition, the RMP will be consistent with administration priorities including sustainably developing our energy and natural resources, increasing revenues to support the department and national interests, restoring trust and being a good neighbor, Executive Order 13771 of January 30, 2017 (Reducing Regulation and Controlling Regulatory Costs), and Executive Order 13783 of March 28, 2017 (Promoting Energy Independence and Economic Growth).

1.1.2.3 Decisions to be Made

Decisions in land use plans guide future land management actions and subsequent site-specific implementation decisions. Section 202(c) of FLPMA (43 United States Code [USC] 1712) requires that, in developing land use plans, the BLM use and observe the principles of multiple use and sustained yield, take a systematic and interdisciplinary approach to integrated management, give priority to ACECs, rely on resource inventories, consider both present and potential uses along with the relative scarcity of values weighed with long-term benefits to the public, and provide for compliance with applicable laws, standards, and plans.

1.2 PLANNING AREA

The CFO planning area is in southeastern New Mexico (Figure 1-1) and comprises Eddy and Lea Counties, and a portion of Chaves County. The planning area encompasses approximately 6.2 million acres and includes the communities of Artesia, Carlsbad, Hobbs, Jal, Hope, and Lovington. Decisions in the approved RMP would affect approximately 2.1 million surface acres of federal land (CFO) and 2.7 million acres of federal mineral estate (1.9 million acres is split estate). Much of the public land is consolidated in large tracts, with state and private inholdings scattered throughout the planning area. RMP decisions would only apply to BLM-administered surface and mineral estate.

Table 1-1 provides a summary of surface land ownership in the planning area. Decisions made and management direction in the Draft RMP/EIS apply to land and resources in the planning area according to the BLM's administrative authority and responsibility for those lands and resources.

Table 1-1. Surface Land Ownership Overview of the Carlsbad Field Office Planning Area

Land Ownership	Acres	Percentage of Planning Area
Surface Ownership		
Public land (managed by the BLM)	2,093,000	33%
U.S. Forest Service	174,000	3%
National Park Service	47,000	<1%
Bureau of Reclamation	14,000	<1%
U.S. Department of Energy	10,000	<1%
State of New Mexico	1,570,000	25%
Private land	2,352,000	38%
Total Surface Land Ownership	***6,260,000***	***100%***

The planning area is mostly rural in nature; is primarily a desert landscape; and includes parts of three ecoregions, the Chihuahuan Desert, Arizona/New Mexico Mountains, and High Plains. The terrain consists mostly of basins broken up by small mountain ranges. The planning area ranges in elevation from 866 to 7,487 feet above mean sea level. The lowest point in the state of New Mexico is located on the Red Bluff Reservoir in Eddy County, where the impounded Pecos River flows out of New Mexico into Texas. The highest point in the planning area is Dog Canyon Rim in the Guadalupe Escarpment. The planning area also includes the Delaware, Pecos, and Black Rivers.

The planning area has been a historical oil and gas drilling province for nearly a century, containing some of the most prospective geologic plays in the United States. This complex geology in the Delaware Basin includes the Wolfcamp shale formation recently assessed by the USGS as their largest resource assessment ever conducted. The CFO boundary also encompasses Carlsbad Caverns National Park, managed by the National Park Service (NPS). Visitors from all over the world travel to Carlsbad to visit Carlsbad Caverns. Also within the planning area is the Lincoln National Forest, managed by the U.S. Forest Service (USFS). The Texas border area includes the Guadalupe Mountains National Park, another tourist destination. The Waste Isolation Pilot Plant (WIPP) is in eastern Eddy County and is a deep geological repository for transuranic radioactive waste. The WIPP area is managed by the U.S. Department of Energy.

Primary uses of BLM-administered lands in the planning area are oil and gas extraction, potash mining, caliche mining, livestock grazing, and off-highway vehicle (OHV) recreation. The CFO also manages one of the largest cave and karst landscapes in the world.

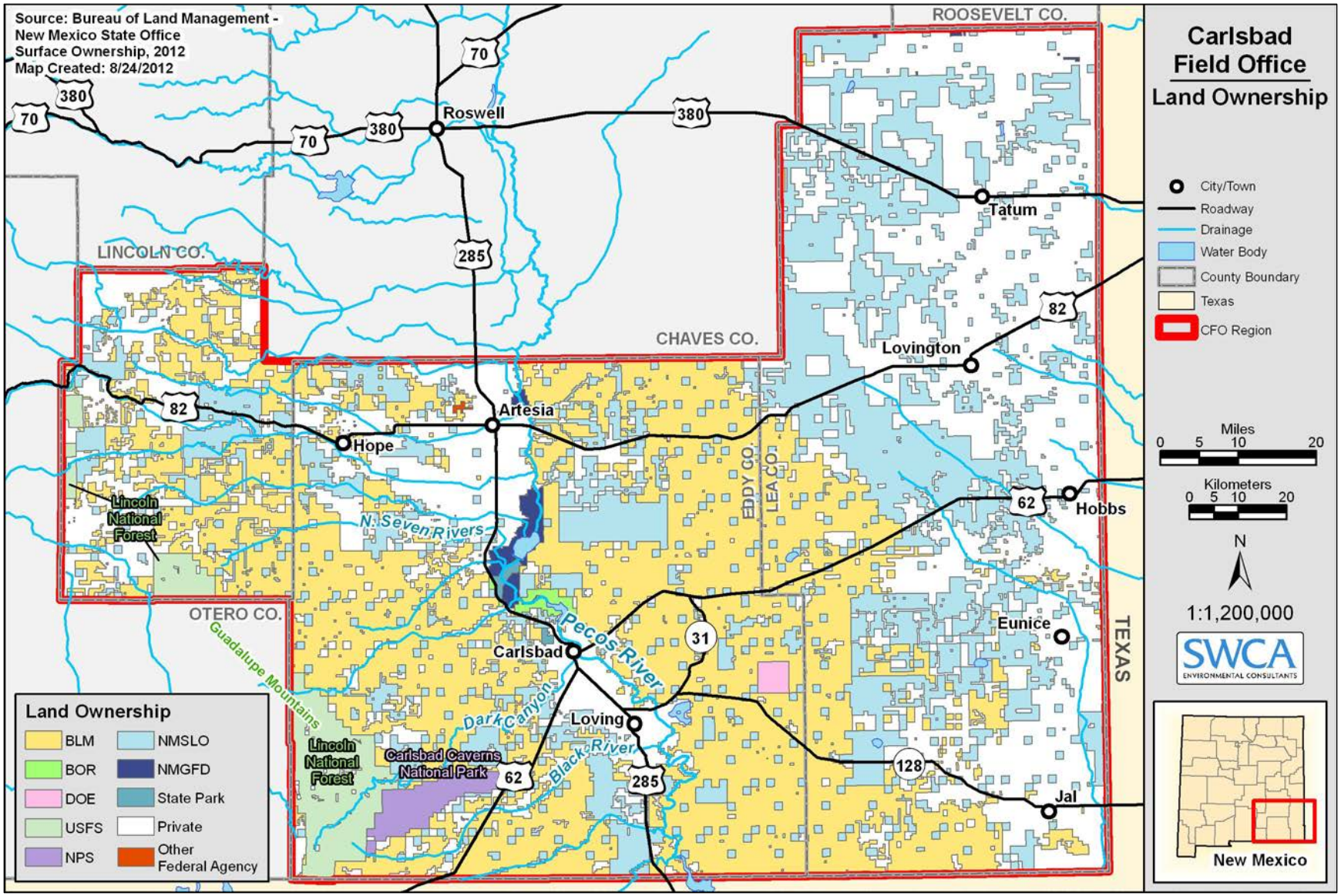

Figure 1-1. Carlsbad Field Office planning area.
(NMSLO = New Mexico State Land Office; NMDGF = New Mexico Department of Game and Fish).

1.3 PLANNING ISSUES

1.3.1 Issues Addressed in this Resource Management Plan

The process for developing an RMP begins with identification of planning issues (40 Code of Federal Regulations [CFR] 1502.7 and 43 CFR 1610.4-1). Planning issues are topics in which there are substantial, often mutually exclusive, differences in opinion as to how a resource or use should be managed. These issues reflect trade-offs associated with different land management strategies. Because resources and uses in the planning area are interdependent, issues often overlap. Issues were used to develop alternatives designed to address and/or resolve the key planning issues. Issues are identified through internal scoping with the BLM's CFO RMP ID team, and through external scoping with agency cooperators and the public. The *Analysis of the Management Situation* (AMS; BLM 2014) for the Carlsbad RMP/EIS illustrates many of the concerns raised through internal scoping.

Public scoping is an important NEPA tool that helps the BLM determine which issues the RMP should address. Public scoping was initiated by the publication of the notice of intent (NOI) to develop the Carlsbad RMP and associated EIS in the *Federal Register* on June 10, 2010. The CFO then held 10 public meetings in various locations throughout the planning area. The public scoping process and results are summarized in the *Public Scoping Report for the Carlsbad Field Office Resource Management Plan / Environmental Impact Statement* (BLM 2011).

All comments received during the scoping period were used to formulate the planning issues presented below. Each planning issue is followed by a summary of the major concerns regarding that issue expressed during scoping. A series of planning questions was developed for each issue to help characterize the major components of the issue; the answer to each question varies by one or more of the management alternatives presented in Chapter 2. Finally, to help the reader quickly identify how each issue is addressed throughout the alternatives, a list of the key differences between alternatives is presented.

Five primary issues were identified: 1) Minerals Development, 2) Renewable Energy Development/Lands and Realty, 3) Special Designations, 4) Watershed Management, and 5) Recreation and Travel Management.

1.3.1.1 Issue 1: Minerals Development

1.3.1.1.1 Issue 1a: Fluid and Solid Minerals Development

Concerns Expressed during Scoping

- Conditions of Approval (COAs) should be changed or added to include maintenance of cattle guards. Damage to cattle guards results in loose cattle, traffic accidents, and cattle getting into the wrong pastures.
- Size and timing restrictions should be placed on rig moves.
- Oil and gas companies should be mandated to clean up and keep wells clean of trash and debris.
- The rule of reseeding should be enforced.
- Stipulations required for future oil and gas leasing should be the least restrictive necessary to adequately protect other resource values.
- Oil and natural gas development is a crucial part of the BLM's multiple-use mandate. Oil and gas development should not be unreasonably limited.
- Alternatives containing overly stringent restrictions or COAs may render development uneconomical and should not be analyzed, as NEPA requires alternatives to be feasible. Alternatives that prohibit or eliminate all oil and gas development within the area are neither practical nor reasonable and should not be analyzed in detail.

- Regulations, BMPs, and COAs must be justifiable and reasonable. For example, reasonable reclamation does not mean making the land better than it was before it was disturbed. Improvements in condition resulting from reclamation are good, but should not be mandated.
- Existing regulations at the federal and state levels, as well as COAs, make additional BMPs for oil and gas development unnecessary.
- Current requirements and policies for oil and gas development would likely reveal that new stipulations and BMPs may not be necessary or reasonable. Enforcement of these requirements and policies may be adequate.
- Companies should flare off natural gas.
- Illegal dumping of produced water should be addressed.
- Grates should be longer and wider to accommodate large equipment. Oil companies should take responsibility for maintenance and improvements to damaged cattle guards as a result of oil and gas development.
- The cost to ranching (actual dollars and risk exposure to the rancher) due to oilfield impacts should be analyzed.
- There are excessive well pads.
- Wells are too close to the rivers in the planning area.
- Pit reclamation should occur. Groundwater and surface vegetation should be protected from pits and caliche pads on split estate lands.
- Ranchers and oil companies must take responsibility for maintaining the integrity of land and water.
- Oil and gas development results in noxious weeds.
- Hydraulic fracturing causes pollution and is a public health hazard.
- Approval of wells along potash mine boundaries effectively creates a fence line where potash mines cannot expand past.
- Concurrent development can introduce safety issues, such as introduction of hydrocarbons into the mines or increased pressure on well bores from subsidence related to underground mines.

Planning Questions

- What areas are suitable, not suitable, or should be restricted from minerals development in the planning area?
- How should new technologies, such as solution mining for potash or directional drilling for oil/gas development, be addressed in the RMP?
- Are current management actions regarding fluid minerals development still valid? What types of new decisions can be made for these areas, where appropriate?
- How will conflicts between minerals development and other resource issues such as wildlife and special status species habitat, livestock grazing, recreation, cultural resources, special designations, water resources, cave/karst resources, visual resources, and travel management be addressed?
- What updated/new BMPs are needed for mineral decisions?
- What inventories, BMPs, and mitigation measures are needed for abandoned mines?
- How should the RMP allocate where geophysical exploration should be restricted or excluded?
- How should saltwater disposal from minerals development be addressed? What is the relationship between the saltwater disposal system and rock mechanics?
- What are the public health risks from gas migration from oil and gas wells into underground potash mines?
- How will the RMP consider the economic benefits of current and future oil and gas development?
- How can the RMP allow for increased potash mining while still protecting resources throughout the planning area?
- Can the RMP allow the oil and gas industry and potash industries to settle their own disputes?

1.3.1.1.2 Issue 1b: Impacts to Visual Resources from Mineral Development

Concerns Expressed during Scoping

- Faster reclamation of abandoned well pads and roads that impact viewsheds is needed. The lesser prairie-chicken areas should be prioritized for reclamation efforts.
- Oil and gas infrastructure should be painted with the appropriate landscape colors to better blend with the landscape.
- Well pads should be placed further from major highways.
- Oil and gas development should be limited or restricted along the backcountry byway through Rocky Arroyo.

Planning Questions

- What are the critical viewshed areas and how should they be managed?
- How will current visual intrusions that do not meet existing VRM guidelines be mitigated and/or restored?
- How should the CFO and other adjoining federal agency (e.g., NPS, USFS) VRM decisions be coordinated?

1.3.1.1.3 Issue 1c: Impacts to Air Quality from Mineral Development

Concerns Expressed during Scoping

- The BLM should consider regional and local air quality studies and seasonal air issues, such as heat in the summer and dust from spring winds.
- In recent years, rapid oil and gas development has resulted in reduced air quality in local communities and rural areas.
- Can the BLM consider more carbon sequestration?

Planning Questions

- What management actions are necessary to maintain and/or enhance air resources, including maintaining and/or improving air quality within state and federal air quality standards?
- How may related actions affect Class I airsheds, including adjoining federal public lands such as Carlsbad Caverns and Guadalupe Mountains National Parks?
- What management actions and mitigation may be necessary to help address greenhouse gas emissions from Draft RMP/EIS alternatives?

1.3.1.2 Issue 2: Renewable Energy Development/Lands and Realty

1.3.1.2.1 Issue 2a: Renewable Energy (e.g., solar and wind)

Concerns Expressed during Scoping

- Development of alternative energy should occur where it is appropriate and where it does not degrade public land use values.
- A long review and study time to determine impacts of wind turbines on raptors, migratory birds, and bats, and where impacts may occur on the ground, should occur.
- Consideration must be given to possible impacts of renewable projects on existing use. Some projects could have an adverse impact on oil and gas operations if magnetic currents are generated. These currents could pose corrosion concerns not only with pipelines but also with casing integrity. The best available science should be used to foster concurrent development.
- Areas near established wilderness areas, ACECs, and national and state parks should be excluded from renewable energy development.
- Existing utility corridors should be used for renewable energy where possible.

Planning Questions

- How will other ongoing local/regional/national renewable energy planning efforts be addressed in the RMP?
- What areas should be restricted or excluded from renewable energy development in the planning area to reduce or avoid resource conflicts and/or impacts?
- Would buffers be established for resource protection and/or site safety?
- What updated/new BMPs are needed for renewable energy decisions?
- What utility corridors (i.e., transmission corridors) need to be identified in the area to deliver renewable sources of power to the grid?
- Would competitive renewable leasing be addressed in the plan?

1.3.1.2.2 Issue 2b: Lands and Realty

Concerns Expressed during Scoping

- Pipelines that cross recreation trails should be removed or realigned to reduce or eliminate impacts to recreationists.
- The BLM should seek to acquire riparian areas in its resource management efforts under the RMP.
- The BLM should consolidate its lands where possible.

Planning Questions

- What public lands should be identified for retention, disposal, or acquisition?
- What types of new withdrawals will be initiated through the Draft RMP/EIS?
- What existing ROW avoidance and exclusion areas need to be updated? What areas are suitable for wind and solar development and what areas should be avoided or excluded?
- How would ROW/energy corridors be established and addressed in the new RMP?
- What areas are designated for communication sites? Would those locations be maximized to the fullest extent before a new communication site is authorized?
- What land tenure adjustments are necessary to improve access and management of BLM-administered public lands?
- What updated/new BMPs (e.g., surface pipeline thresholds, adequate ROW widths for construction) are needed for realty decisions?
- What updated/new BMPs (e.g., road maintenance agreements) are needed for other management decisions?

1.3.1.3 Issue 3: Special Designations

1.3.1.3.1 Concerns Expressed during Scoping

- Special areas should be protected by limiting vehicle use and development.
- Pierce and Cedar Canyons should be designated as special use areas.
- Can cattle be removed permanently from the riparian area of the Delaware River?
- The Delaware River should be nominated for inclusion in the National Wild and Scenic Rivers System.
- Areas considered for wilderness protection should include the area at the mouth of Big Canyon, the BLM-administered land to the north of Carlsbad Caverns National Park, and a sand hills area in eastern Eddy County.
- Dark Canyon should be nominated as a scenic byway.
- All the desert heronry areas where great blue herons (*Ardea herodias*) nest should be considered for ACECs. These desert-nesting herons are the only ones known throughout its range and, thus, are unique to this area.

Planning Questions

- Which existing ACECs should be carried forward (expanded/maintained) or revised in the new RMP? What are potential new ACECs?
- Should any of the existing Special Management Areas (SMAs) be incorporated into ACECs, research natural areas, outstanding natural areas, or other designations and/or be dropped?
- Are there any other designations (e.g., national natural landmarks through the NPS system) that should be considered? How should the other existing special designations (e.g., the Guadalupe Backcountry Byway) be managed?
- What cultural resources should be considered for nomination for listing on the National Register of Historic Places (NRHP)?
- What BMPs are needed for special designations such as ACECs?
- What river segments are eligible and/or suitable for inclusion in the National Wild and Scenic Rivers System (Black River, Delaware River, or parts of the Pecos River)?
- What protective management practices are necessary to protect and enhance the outstandingly remarkable values on eligible and suitable river segments?

1.3.1.4 Issue 4: Watershed Management

1.3.1.4.1 Issue 4a: Groundwater and Karst Aquifers

Concerns Expressed during Scoping

- Groundwater quality and quantity should be closely monitored. Specific protection should be implemented for the Capitan Aquifer.
- Water for drilling operations should be considered a temporary use.

Planning Questions

- What are the potential impacts of draft activities such as oil and gas development on groundwater and related karst aquifers?
- How can groundwater resources and karst aquifers be identified and protected to meet state and federal standards, while allowing other resource uses?
- What groundwater baseline data are needed to help make management decisions and monitor changes to groundwater quality?
- What new BMPs should be implemented to protect groundwater/karst resources? What existing BMPs should be carried forward?
- How should water sales for oil field development, road construction, etc., from wells on public land be managed? Should temporary use be handled differently than commercial water sale sites?
- What is the impact from surface retention ponds related to potash mining, as well as solution mining, on water resources?

1.3.1.4.2 Issue 4b: Water Quality and Usage/Watershed Health

Concerns Expressed during Scoping

- Grazing should be limited in high erosion areas, increased erosion has greatly altered streams, rivers, and springs across the Southwest and southeastern New Mexico.
- Riparian areas should be protected. Riparian areas account for less than 1% of habitat in New Mexico, yet over 75% of endangered and threatened species in the state require riparian habitat for a major portion of their lifecycle.

Planning Questions

- What management prescriptions are necessary to ensure watershed health and properly functioning aquatic ecosystems or to provide for other public uses?
- What BMPs are needed to improve water quality by reducing soil erosion?
- How will Draft RMP/EIS actions on CFO public lands maintain, improve, or restore stream morphology and provide beneficial uses of riparian vegetative areas for aquatic and wildlife communities?

1.3.1.4.3 Issue 4c: Land Health

Concerns Expressed during Scoping

- The BLM should work to create a proper and more historical balance in plant communities by controlling all exotics and natives where they are out of balance. The commenter felt this potential increase of grass should be to benefit wildlife and never result in an increase in animal unit months (AUMs) for livestock on BLM-administered land.
- Potential conflicts between Restore New Mexico vegetation treatments and current and future mineral development should be addressed.
- Illegal dumping on BLM-administered lands should be addressed.

Planning Questions

- What types of restoration methods should be used to improve/maintain rangeland health?
- What criteria should be used to develop desired plant community descriptions?
- What criteria should be considered to determine the type and amount of rangeland vegetation that will be deemed forage for use by livestock and/or wildlife, and/or set aside for watershed protection?
- What criteria should be used to apportion the forage allocated among wildlife and livestock? What criteria should be used to decide when, if, and to what degree the forage allocations should be modified in the future? How should the reclaimed/restored public lands be managed?
- What BMPs are needed for reclaimed/restored public lands?

1.3.1.4.4 Issue 4d: Wildlife

Concerns Expressed during Scoping

- Limitations or restrictions on development should be included in dunes sagebrush lizard and lesser prairie-chicken habitat areas.
- The BLM should consider plans to reintroduce the black-tailed prairie dog (*Cynomys ludovicianus*) to Eddy County.
- The RMP should incorporate management strategies found in the *Comprehensive Wildlife Conservation Strategy for New Mexico* (New Mexico Department of Game and Fish [NMDGF] 2006).

Planning Questions

- What areas in the CFO should be designated as priority habitats for wildlife?
- What actions and area-wide use restrictions are needed to achieve desired population and habitat conditions?
- What strategies can be employed to reduce habitat fragmentation?

1.3.1.5 Issue 5: Recreation and Travel Management

1.3.1.5.1 Concerns Expressed during Scoping

- Area(s) should be designated and managed for equestrian use.
- The BLM should identify protected areas and limit use of OHVs in protected areas.
- OHV use by hunters impacts livestock grazing and private property.
- The BLM should propose management to prevent vandalism, trash dumping, and unauthorized off-road driving.
- The BLM should actively manage for non-disturbing recreational activities such as wildlife and plant viewing, birding, and other observing.
- Additional areas could be developed for camping and picnicking.
- OHV users protect and want the land to stay in a natural state. They enjoy the clean air and the beauty of nature, and want to see it protected. They want it to stay as a wilderness.
- Both Hackberry Lake East (sand dunes) and West are assets to the public.
- OHVs allow people who could not otherwise get there (elderly, disabled families, etc.) to enjoy public lands as well.
- No part of the currently designated OHV areas should be closed to use unless for temporary need.
- Could a speed limit or speed controls (bumps) be placed on some BLM roads to make back road areas safer for recreationists and reduce fugitive dust emissions?
- Riverbank areas should be closed to motor vehicle use.
- The BLM should consider closure of unnecessary roads.
- The planning area should be designated as OHV limited rather than open.

Planning Questions

- What are the new opportunities and areas suitable for recreation?
- What types of recreation should the planning area emphasize, discourage, or limit?
- What new recreation designations should be proposed, such as Special Recreation Management Areas (SRMAs)? How should existing recreation areas that are not formally designated (e.g., Black River Recreation Area, La Cueva Non-Motorized Trail System, developed OHV areas) be addressed?
- To what extent, if any, should the CFO develop facilities and improve recreation access opportunities to meet public demand?
- What are the current recreation interests of the community and adjoining residents, as well as tourists?
- Do opportunities exist to expand recreational activities in partnership with adjoining local, state, and federal agencies?
- What major roads and ways should be identified for closure? Are there alternative routes and opportunities for reclamation?
- What areas should be identified as open, limited, or closed, while still meeting the resource and recreational demands of the area?
- What public access areas should be identified and acquired?

1.3.2 Issues Considered but Not Further Analyzed

1.3.2.1 Issues to be Resolved through Policy or Administrative Action

Several scoping comments were submitted regarding issues and concerns that are not addressed in the RMP because they can better be addressed through policy or administrative action. See the final public scoping report (BLM 2011) for a complete and detailed list of all scoping concerns. The BLM does not address these issues in the RMP because they concern fundamental changes in BLM or U.S. Department of the Interior (USDI) policy, would require formal rulemaking, or would require Congress to amend a law. Addressing these issues would not meet the purpose and need for the RMP and would also require additional time or protracted debate that is not compatible with the time-frame of the needs to which the RMP is addressing.

Comments on these items are valuable and appreciated, even though they are not directly addressed in the RMP. These comments are considered where appropriate when decisions are made on implementation plans, draft projects, or day-to-day management. Where applicable, these comments have been forwarded to the BLM's resource specialists for consideration (Table 1-2).

Table 1-2. Public Scoping Comments Considered but Not Addressed in the Resource Management Plan

Issue is resolved via BLM policy making	
• Cultural resource permitting • Required testing before approval of a wind energy project • Compensation to lessee for loss of forage due to oil and gas production and exploration • Charging an additional fee to oil companies and allocating that fee to range improvements on affected allotments • Denying applications for potassium leases when the applicants have no identifiable, substantial, and genuine, and not merely speculative or casual, intent to develop the potash resource (IBLA 2006-254 CAM-COLORADO LLC 12-20-2007) • Withholding oil and gas drilling approvals on all lands in the Potash Area until it definitively determines that such land does not contain commercial potash reserve	• Allowing permitted users to block access to public lands • Using mined-out sections of potash mines for disposal of toxic waste • Using BLM-administered land as a repository for radioactive waste • Ensuring potash is a priority resource in the Potash Area • Considering management actions that would require the BLM to obtain data regarding the presence of potash, and not proceed with approval of Applications for Permit to Drill in the absence of such data • Continuing to support the Permian Basin Programmatic Agreement executed by oil and gas operators, the BLM, and the State of New Mexico regarding the identification and protection of cultural resources
Issue is addressed via formal rulemaking	
• Prohibiting public access without lessee permission • Adopting similar regulatory requirements as the BLM has in the Trona area in Wyoming, including suspending oil and gas leases and closing the area to new leases • Sequencing development of potash before oil and gas in the Potash Area	• Providing for competitive leasing for renewable energy • Raising the potash acreage limitation to allow more beneficial development of the potash resource • Mandating that oil and gas operators log all new boreholes drilled in the Potash Area with geophysical logs in open hole conditions
Issue requires lawmaking or amendment by Congress	
• Designating Wilderness Study Areas as wilderness	

1.3.2.1.1 Land Use and Implementation-Level Decisions

The *BLM Land Use Planning Handbook* (H-1601-1; BLM 2005) provides two categories of decisions: land use plan decisions and implementation decisions. Land use plan decisions are the decisions that are made in the RMP. These broad-scale decisions guide future land management actions and subsequent site-specific implementation decisions. Implementation decisions generally constitute the BLM's final approval allowing on-the-ground actions to proceed. These types of decisions require site-specific planning and NEPA analysis and are generally not addressed in an RMP. The following concerns raised during the scoping period refer to implementation-level decisions and are not be addressed in the RMP:

- Developing trailheads, waters, parking areas, specific trails, and/or horse gates at cattle guards for equestrian uses.
- Denying site-specific Applications for Permit to Drill (APDs) in the Potash Area.
- Granting APDs in the Potash Area during the RMP revision.
- Notifying ranchers by oil and gas companies when development occurs.
- Designating signing to advise hunters of closed roads.
- Inventorying and closing specific routes.
- Developing youth programs.
- Increasing public awareness for how to deal with cattle on the road.

- Accepting public comment on the *Cave and Karst Resource Handbook* (BLM 2008b).
- Conducting NEPA evaluation of APDs, including avoiding inappropriate use of categorical exclusions as found by the Government Accountability Office.
- Determining that ore with high carnallite values should be protected as "known ore."
- Reviewing and approving potash leases.
- Approving potash exploration drilling prior to oil and gas drilling.
- Delineating a potash enclave cutoff boundary within the structure that takes into account the influence of barren or sub-economic data points, rather than rejecting the entire structure.
- Collecting and managing the BLM's data, data needs, and the methods used to collect data, all concerning potash (BLM 2011). These issues will be addressed during implementation-level planning through the EIS process. As the Secretary of the Interior's potash order provides for priority of potash development in the Potash Area, the RMP does not provide additional management direction but instead carries forward the stipulations in the order.

1.3.2.2 Resources or Resource Uses Not Further Analyzed

The following resources, or resource uses, either do not occur in the CFO planning area or do not occur at a scale great enough to manage for on an area-wide basis.

1.3.2.2.1 Wild Horses and Burros

The USDI, through the BLM, protects, manages, and controls wild horses and burros under the authority or the Wild Free-Roaming Horses and Burros Act of 1971. Since 1971, there have been no Herd Areas or Herd Management Areas designated by the BLM within the planning area. Therefore, this resource is not analyzed in the RMP.

1.3.2.2.2 Forestry/Timber Production

The vegetation in the planning area is primarily grasslands and sagebrush and contains only sparse woodland stands, such as mixed oak (*Quercus* sp.), pine (*Pinus* sp.), and juniper (*Juniperus* sp.). Woodland areas do not occur at levels where management would be implemented specifically for the woodland. See Section 3.2.7 Wildland Fire and Fuels Management for management specific to prescribed burn treatments of piñon-juniper stands.

1.3.2.3 Issues beyond the Scope of the Plan Revision

1.3.2.3.1 Issues Addressed through Separate Environmental Analysis

The BLM CFO evaluated two proposed potash mine projects in separate EISs: the HB In-situ Potash Solution Mine Project and the Ochoa Potash Mine Project. The analysis for these two specific projects will not be repeated in the Draft RMP/EIS.

1.3.2.3.2 Issues outside the Bureau of Land Management's Jurisdiction

In some cases, public scoping revealed concerns that are outside the BLM's jurisdiction to address in the RMP. For example, one commenter expressed concern regarding OHV trails on USFS lands. In another case, a commenter wished to have a cultural site entered in the NRHP. Comments such as these would not be resolved through the RMP process because they are outside the BLM's jurisdiction and the purpose and need of the RMP. Concerned members of the public may direct these inquiries to the appropriate managing agency. Please see the *Final Public Scoping Report* for a detailed summary of comments (BLM 2011).

1.4 PLANNING CRITERIA AND CONSTRAINTS

The BLM planning regulations (at 43 CFR 1610.4-2) require development of planning criteria to guide preparation of an RMP. *Planning criteria* are the standards, rules, and other guidelines developed by managers and ID teams, with public input, for use in forming judgments about planning-level decision making, analysis, and data collection. These criteria are used to establish the parameters or "ground rules" for making planning decisions and simplifying RMP actions. The criteria may be adjusted during RMP development based on management concerns and the results of the public scoping process. Planning criteria for the Draft RMP/EIS are as follows:

- The RMP will be in compliance with FLPMA, NEPA, and all other applicable federal laws, regulations, and policies.
- Land use decisions in the RMP will apply to the surface and subsurface estate managed by the BLM only.
- Land use decisions in the RMP will conform to the principles of multiple use and sustained yield.
- For program-specific guidance for decisions at the land use planning level, the process will follow the BLM's policies in the *Land Use Planning Handbook*, H-1601-1 (BLM 2005).
- Public participation and collaboration will be an integral part of the planning process.
- The BLM will strive to make decisions in the plan compatible with the existing plans and policies of adjacent local, state, and federal agencies and local Native American tribes, as long as the decisions are consistent with the purposes, policies, and programs of federal laws and regulations applicable to public lands.
- The BLM will recognize in the RMP the State of New Mexico's responsibility and authority to manage wildlife. The BLM will also consult with the NMDGF.
- The RMP will recognize valid existing rights.
- The RMP will incorporate, where applicable, management decisions brought forward from existing planning documents.
- Planning decisions will be made with appropriate consideration of climate-related impacts, to the extent that such impacts are made known or reasonably foreseeable through the application of reliable scientific tools and sound methodologies.
- The BLM will work with cooperating agencies to develop alternatives for resolution of resource management issues and management concerns related to the interest of those agencies.
- The BLM will consider public welfare and safety when addressing hazardous materials and fire management.
- Geographic information system (GIS) and metadata information will meet Federal Geographic Data Committee (FGDC) standards, as required by Executive Order 12906, as amended. All other applicable BLM data standards will also be followed.
- The planning process will provide for ongoing consultation with Native American tribes and strategies for protecting recognized traditional uses.
- Planning and management direction will focus on the relative values of resources and not the combination of uses that will give the greatest economic return or economic output.
- The BLM will consider the quantity and quality of non-commodity resource values.
- Where practicable and timely for the planning effort, the best available scientific information, research, and new technologies will be used.
- Actions must comply with all applicable regulations and must be reasonable, achievable, and allow for flexibility while supporting adaptive management principles.
- The U.S. Census Bureau's employment statistics and IMPLAN (a software system that helps analysts address questions about economic study) will be used as one source of demographic and economic data for the planning process.

1.5 PLANNING PROCESS

1.5.1 Steps in the Process

The list below shows the required planning steps for RMP/EIS-level planning efforts.

1.5.1.1 Prepare to Plan

The *Preparation Plan for the Carlsbad Resource Management Plan and Environmental Impact Statement* (BLM 2010b) was written by a full BLM ID team. This document provides the foundation for the entire planning process by identifying the preliminary issues to be addressed and the skills needed to address them. It also outlines a preliminary budget, preliminary planning criteria, and data and metadata available and needed.

1.5.1.2 Issue an NOI to Prepare the RMP/EIS and Conduct Scoping

Scoping is a requirement of both NEPA and BLM planning regulations. Before scoping begins, the BLM must publish an NOI in the *Federal Register* to announce its decision to prepare an EIS for an RMP. The CFO published an NOI in the *Federal Register* on June 10, 2010. The NOI formally began the scoping process. The BLM submitted a news release to local media and the Associated Press and developed a website devoted to the RMP revision. The BLM also mailed a notice to a list of contacts maintained by the CFO. The CFO hosted 10 public meetings where the public was encouraged to submit comments on the RMP revision. The formal scoping period ended on August 30, 2010, 30 days after the last public meeting. The CFO published a *Final Public Scoping Report* in May 2011 with the results of the input (BLM 2011).

1.5.1.3 Analyze the Management Situation

The CFO RMP ID team analyzed the available inventory data and other information to characterize the resource area profile, portray the existing management situation, and outline management opportunities to respond to identified issues. The AMS was completed in 2014 and is on file at the CFO and available on the ePlanning project website: https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=90928

1.5.1.4 Formulate Alternatives

In compliance with 40 CFR 1502.14, the ID team considered a reasonable range of alternatives. These alternatives outline various ways of addressing the planning issues, management of the resources, and uses in the planning area. This step and the results of the alternative development process can be found in Chapter 2.

1.5.1.5 Analyze the Impacts of the Alternatives

The ID team estimated and described the physical, biological, economic, and social impacts of implementing each alternative. The alternatives are considered in detail in this Draft RMP/EIS, including the No Action Alternative (43 CFR 1610.4-6). This analysis of impacts is presented in Chapter 4.

1.5.1.6 Select a Preferred Alternative

By evaluating the alternatives in the Draft RMP/EIS, the BLM ID team has determined which combination of potential planning decisions contained in the alternatives best meets the mandates of multiple use and sustained yield contained at Section 103(c) of FLPMA (43 USC 1702(c)). The BLM has chosen Alternative C as the Preferred Alternative. However, the BLM is not obligated to select this alternative and may modify

the Preferred Alternative as a result of the public comments on the Draft RMP/EIS. The selection of a Preferred Alternative at the Draft RMP/EIS stage is required by regulation (43 CFR 1610.4-7) and does not indicate the BLM's final decision.

1.5.1.7 Prepare a Draft RMP/EIS

The draft document describes the purpose and need for the plan (Chapter 1), the alternatives for managing the public lands within the planning area (including the Preferred Alternative) (Chapter 2), the affected environment (Chapter 3), the environmental impacts of implementing the alternatives (Chapter 4), and the consultation and coordination in which the BLM engaged during plan development (Chapter 5).

1.5.1.8 Publish a Notice of Availability and Provide a 90-day Public Comment Period

Following publication of the Notice of Availability (NOA) in the *Federal Register* by the U.S. Environmental Protection Agency (EPA), the BLM will provide 90 days for the public to comment on the Draft RMP/EIS. The CFO will also announce the start of the comment period (and the dates, times, and locations of public meetings) through other means, such as direct mail, email, and internet posting.

1.5.1.9 Prepare the Proposed RMP and Final EIS

The Proposed RMP/Final EIS builds on the Draft RMP/EIS, including appropriate responses to substantive public comments received on the draft, as well as a description of the comments received. It also corrects errors in the Draft RMP/EIS identified through the public comment process and internal BLM review. The Proposed RMP/Final EIS may contain modifications to the alternatives and the accompanying impact analysis contained in the Draft RMP/EIS.

1.5.1.10 Publish an NOA, Provide a Protest Period, and Resolve Protests

The issuance of the Proposed RMP/Final EIS officially occurs with the EPA's publication of an NOA for the document in the *Federal Register*. The BLM also publishes an NOA, which contains information about the project, protest period and filing instructions, contact information, and other supplemental information not contained in the EPA's NOA. Individuals and entities have 30 days from the publication of the EPA's NOA for the document to file a protest with the BLM Director. People and entities that participated in the planning process prior to the protest stage may file protests (43 CFR 1610.5-2). BLM staff will then review and respond to valid protests by publishing a protest resolution report. Protests may lead to changes in the Record of Decision (ROD) and approved RMP.

1.5.1.11 Provide a Governor's Consistency Review Period

In addition to a 30-day protest period, the BLM must also provide a 60-day review period for the Governor of New Mexico to examine consistency with state and local plans, policies, and programs.

1.5.1.12 Prepare a ROD and Approved RMP

The Carlsbad RMP is officially approved when the State Director signs a ROD. The approved RMP outlines the goals, objectives, and management actions chosen by the State Director from the Proposed RMP/Final EIS. The ROD provides rationale for these decisions. The ROD/approved RMP serves as a concise and useful tool for land managers and stakeholders.

1.5.2 Internal Review and Oversight

The Draft RMP/EIS was prepared using the outline in the BLM's *Land Use Planning Handbook*. During preparation of the RMP, internal document review was conducted by the BLM CFO and New Mexico State Office (state office) staff. The Preliminary Draft RMP/EIS was presented to the BLM New Mexico State Director and senior management staff for initial review and approval. Any other potential legal issues that may surface during the planning process will be brought to the immediate attention of the state office and solicitor by the field manager and project team leader for guidance.

1.5.3 Relationship to Bureau of Land Management Policies, Plans, and Programs

The Draft RMP/EIS seeks to define planning policies and goals that will be maintained and achieved over time. Because planning is an ongoing and continuous process, this Draft RMP/EIS is a dynamic document. Land uses can often compete for the same resource base, and ultimately the plan serves to reflect the desired outcomes of the public and the BLM. All BLM policies will be upheld, and the RMP does not make changes to policy. The following programmatic plans are relevant because they contain BLM management that applies to the CFO planning area and were therefore considered during the development of this plan:

- *Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States* (USFS and BLM 2008). The analysis area for this EIS includes the CFO planning area.
- *Final Resource Management Plan Amendments/Record of Decision (ROD), Designation of Energy Corridors on Federal Land in 11 Western States* (BLM and U.S. Department of Energy 2008). Includes designation of energy corridors in New Mexico, including the CFO planning area.
- *Final Programmatic Environmental Impact Statement on Wind Energy Development on Bureau of Land Management-Administered Lands in the Western United States* (BLM 2008c). The analysis area for this EIS includes the CFO planning area.
- *Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States* (BLM and U.S. Department of Energy 2011). The analysis area for this EIS includes the CFO planning area.
- *Final Programmatic Environmental Impact Statement of Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (BLM 2007). Applicable policies, BMPs, and mitigation have been incorporated into this RMP.
- *Decision Record and Resource Management Plan Amendment for Fire and Fuels Management on Public Land in New Mexico and Texas* (BLM 2004). This plan amended fire management in all BLM New Mexico field offices; applicable management has been incorporated into the *Carlsbad Field Office Fire Management Plan* (BLM 2010c) and this Draft RMP.
- *Draft Secretarial Order Revising Rules for Co-Development of Oil & Gas and Potash Resources in Southeast New Mexico* (BLM 2012). This Secretarial Order directly affects use of lands in the CFO planning area.
- *Permian Basin Programmatic Agreement* (Permian Basin PA), 2013 (formerly a Memorandum of Agreement, with the CFO, the New Mexico SHPO, the New Mexico Oil and Gas Association, and the Advisory Council on Historic Preservation) amended in May of 2016.

1.5.4 Collaboration

1.5.4.1 Intergovernmental and Interagency Relationships

The CFO invited applicable federal and state agencies, local governments, and tribes to be cooperating agencies. Some invitees elected not to participate as cooperating agencies. The BLM will continue to consult with the tribes regardless of cooperator status. Cooperating agencies may include, but are not limited to, those listed in Table 1-3.

Table 1-3. Invited Cooperating Agencies

Federal agencies	**U.S. Department of Energy***	National Park Service
	U.S. Fish and Wildlife Service	Federal Highway Administration
	U.S. Bureau of Reclamation*	U.S. Public Health Service
	U.S. Geological Survey, Bureau of Mines	U.S. Department of Agriculture
	U.S. Forest Service	**Natural Resources Conservation Service***
State agencies	State of New Mexico	New Mexico Department of Game and Fish*
	New Mexico Department of Cultural Affairs	New Mexico Energy, Minerals and Natural Resources Department
	New Mexico Environmental Department	New Mexico Department of Transportation
	New Mexico State Land Office	New Mexico Department of Agriculture
Regional and local entities	**Eddy County Commission***	**Carlsbad Soil and Water Conservation District***
	Chaves County Commission*	City of Carlsbad
	Lea County	City of Artesia
	Lea County Soil and Water Conservation District	**City of Eunice***
	Carlsbad Irrigation District*	**City of Jal***
		Lea County Water User Association*
Tribal entities	Bureau of Indian Affairs	Pueblo of Isleta
	Mescalero Apache Tribe	Kiowa Tribe of Oklahoma
	Apache Tribe of Oklahoma	Ysleta del Sur Pueblo
	Comanche Indian Tribe	Hopi Tribal Council

*Confirmed as a cooperator.

1.5.4.1.1 Coordination with Adjoining Bureau of Land Management District Offices and Consultation with Other Federal Agencies

The CFO is coordinating throughout the planning process with neighboring BLM offices to ensure that planning decisions complement and do not conflict, to the extent possible, with those of adjoining planning areas. The CFO is also conducting consultation with the EPA and Section 7 consultation under the Endangered Species Act with the U.S. Fish and Wildlife Service (USFWS). The BLM is coordinating, as appropriate, with the following New Mexico state agencies: New Mexico Energy, Minerals and Natural Resources Department; New Mexico Environment Department; New Mexico State Land Office; Governor of New Mexico; New Mexico State Historic Preservation Office; NMDGF; and New Mexico Department of Transportation.

The CFO is also participating as an active member of the New Mexico Air Quality Working Group, which consists of the BLM, USFS, NPS, USFWS, and EPA. This group is convened under the authority of the *Memorandum of Understanding among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the National Environmental Policy Act Process* (U.S. Department of Agriculture, USDI, and EPA 2011). The purpose of this group is to ensure, to the maximum extent practicable, that federal decisions relating to oil and gas will not cause or contribute to exceedances of the National Ambient Air Quality Standards, nor adversely impact air quality related values in Class I or sensitive Class II areas.

1.5.4.2 Tribal Consultation

The BLM is conducting government-to-government coordination and consultation with the following Native American tribes:

- Mescalero Apache Tribe
- Apache Tribe of Oklahoma
- Comanche Indian Tribe
- Pueblo of Isleta
- Kiowa Tribe of Oklahoma
- Ysleta del Sur Pueblo
- Hopi Tribal Council

1.5.4.3 Other Stakeholders

The BLM Pecos District Manager has been engaging the resource advisory council (RAC) since 2007 regarding resource management and planning issues on BLM public lands. The Pecos District RAC comprises 10 members representing a balance of public land resources and users in the following categories:

- Three members who represent commercial uses or users such as livestock grazing, timber production, mining, oil and gas, realty/ROWs, OHV groups, and commercial recreation such as guides and outfitters.
- Three members who represent environmental organizations, historic/cultural interests, wildlife and other conservation organizations, wild horse and burro interests, and dispersed/general recreation users.
- Three members who represent elected officials, state or other governmental agencies, tribes, academic institutions, and the public at large.

Under direction from the state office, the CFO will work collaboratively with the RAC throughout the process under guidance by the District Manager.

1.5.4.4 Chaves County

Chaves County commissioners have expressed opposition to the nomination of three lands with wilderness characteristic units (LWC) (Units 813, 902, and 909) and one ACEC (Birds of Prey) within the county. As a result, the BLM has developed a range of alternatives in accordance with Secretarial Order 3356 for hunting, fishing, recreational shooting, and wildlife conservation opportunities and coordination with states, tribes, and territories that addresses a variety of public and public officials' concerns in these areas. These areas have been identified as areas with low potential for oil and gas development. The concerns with the LWC units primarily lie with the possibility of the ranchers being economically affected should their ranching infrastructure not be accessible due to the management of the areas to maintain these characteristics or due to the possibility that Congress one day establishes the areas as wilderness areas. It is worth noting that grazing is not prohibited for these particular lands in the Preferred Alternative (Alternative C).

Similarly, the concern with the nominated ACEC is that oil and gas development or cattle grazing may be prohibited as part of the new management of this designated area. In the Preferred Alternative, the Birds of Prey ACEC is not nominated and the area is open to oil and gas development but with a variety of constraints. Grazing is also maintained as open in almost all of the nominated area within the Preferred Alternative.

1.6 RELATED PLANS

According to guidance found in FLPMA and 43 CFR 1610, BLM RMPs and amendments will be consistent, to the extent practical, with officially approved or adopted resource-related plans of tribal, other federal agencies, and state and local governments so long as the guidance and RMPs are compatible. BLM RMPs must also be consistent with the purposes, policies, and programs of FLPMA and other federal laws and regulations related to public lands, including federal and state pollution control laws (43 CFR 1610.3-2(a)). If these other entities do not have officially approved or adopted resource-related plans, BLM RMPs will, to the extent practical, be consistent with those entities' officially approved and adopted resource-related policies and programs. This consistency will be accomplished so long as BLM RMPs incorporate the policies, programs, and provisions of public land laws and regulations and federal and state pollution control laws (43 CFR 1610.3-2(b)). The titles listed below are related plans and environmental analyses that BLM staff members have reviewed for consistency. In some cases, alternatives in this RMP may propose management scenarios or decisions that are not consistent with related plans. Evaluation of consistency is factored into management decisions carried forward into the next iteration of the RMP, the Proposed RMP/Final EIS:

- Federal plans
  - *Lincoln National Forest Land and Resource Management Plan* (September 1986), as amended (USFS 1986)
  - *Black-Footed Ferret Recovery Plan, Second Revision* (USFWS 2013)
  - *Final Recovery Plan for the Southwest Willow Flycatcher* (USFWS 2002)
  - *Guadalupe Mountains National Park General Management Plan Environmental Impact Statement* (NPS 2012)
  - *Carlsbad Caverns National Park Cave and Karst Management Plan and Environmental Assessment* (NPS 2007)
  - Brantley and Reservoir Resource Management Plan as amended (Bureau of Reclamation 2011)
  - Department of Energy, Waste Isolation Pilot Plan (WIPP) Land Management Plan (DOE 2015)
- State plans
  - New Mexico Environmental Department's (NMED's) Strategic Plan (2011)
  - New Mexico Noxious Weed List (New Mexico Department of Agriculture 2016)
  - The Lesser Prairie-Chicken Range-wide Conservation Plan (2013) [New Mexico Game and Fish in coordination with the Interstate Working Group Members]
- County plans
  - Chaves County Comprehensive Plan (2015)
  - 40-Year Water Development Plan, Lea County, New Mexico (2009)
  - Lea County Comprehensive Plan (2005)
  - Lea County Recreation Master Plan (2013)
  - Eddy County Comprehensive Plan (2008)
  - State of New Mexico, County of Eddy, Ordinance No. 41 Land Use Policies and Procedures for Federal, State and County (2002)

Chapter 2:
Alternatives

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Chapter 2: Alternatives

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2.1 VISION STATEMENT

Lying in the southeastern corner of New Mexico in the Chihuahuan Desert, the Bureau of Land Management (BLM) Carlsbad Field Office (CFO) is a unique field office, rich in mineral resources and diverse landscapes. The public lands managed by the CFO support a variety of ecosystems rich in biodiversity and include unique geology not found anywhere else in the United States. Surface needs for development of resources place indirect demands on sensitive desert aquifers, making it incumbent on the agency to look ahead toward incorporating technology and best management practices (BMPs) that could ease the stresses on freshwater aquifers. Current development trends for mineral resources have also created numerous opportunities for the CFO in terms of landscape restoration. These lands and associated resources are vital to the economic stability and sustainability of present and future generations. The CFO aims to maintain the long-term sustainability of all resources in the planning area, in compliance with the Federal Land Policy and Management Act (FLPMA), while concurrently allowing responsible mineral development and recreational use to benefit the local and state economies.

2.2 DESCRIPTION OF ALTERNATIVES

2.2.1 Preferred Alternative

The BLM is required to indicate its preferred alternative in the Draft Resource Management Plan/Environmental Impact Statement (RMP/EIS), per 43 Code of Federal Regulations (CFR) 1610.4-7. The preferred alternative selected for the approved RMP can be a selection of any of the proposed prescriptions in the alternatives. In other words, features from Alternatives A, B, C, D, and the No Action Alternative can be selected to create a new alternative that then becomes the preferred alternative. Alternative C has been preliminarily selected as the preferred alternative, which is the alternative that best meets the purpose and need of the RMP/EIS and best addresses the key planning issues while providing for a balanced approach of protection and preservation of natural resources while providing for commodity production and extraction.

2.2.2 Summary of Alternatives

The purpose of alternatives themes is to address planning issues identified during the internal and external scoping process. To date, approximately four draft themes have been generated to address the issues. Each draft theme is summarized below with examples of proposed management actions.

2.2.2.1 Management Common to All Alternatives

Management common to all alternatives refers to decisions that apply to all the alternatives; the No Action Alternative and Alternatives A–D.

2.2.2.2 Management Common to All Action Alternatives

Management common to all action alternatives refers to decisions that apply to Alternatives A–D.

2.2.2.3 No Action Alternative

The No Action Alternative would be a continuation of the existing management under the current Carlsbad RMP 1988, as amended in 1997 and 2008.

2.2.2.4 Alternative A

Alternative A has been developed to address watershed management and restoration-related planning issues. This alternative would allow development in existing leased/developed areas but would use restoration as a tool to avoid the net loss of natural resources. This alternative focuses on the restoration of previous surface disturbance before new disturbance occurs. High-quality habitat areas would be prioritized for no net loss. Possible restoration focus areas include dunes sagebrush lizard (*Sceloporus arenicolus*; DSL) and lesser prairie-chicken (*Tympanuchus pallidicinctus*; LPC) habitat. Under this alternative certain reclamation measures would be required in certain areas (i.e., priority restoration areas) to enhance overall restoration of the area. The amount of available forage for livestock grazing would be moderately reduced under this alternative. Also, there may be more widespread treatment of noxious weeds and/or more restoration-related vegetation treatments. Alternatively, these efforts may be focused on priority restoration areas based on a set of criteria. Acres available for livestock grazing may be reduced under this alternative with an emphasis on reduction in priority restoration areas. Acres available for leasable mineral development may also be reduced, particularly in priority restoration areas. Under this alternative, Visual Resource Management (VRM) designations may tend more toward VRM Class I, II, and III.

2.2.2.5 Alternative B

Alternative B has been developed to address resource user or resource use conflicts related to leasable mineral development, recreation, and watershed management. This theme would address the resource user or resource use conflicts by geographically separating conflicting uses to the extent possible. This alternative would include resource focus areas where certain resource users/uses are prioritized over other resource users/uses occurring in the same general area. This alternative would also focus on maintaining the existing nature of undeveloped areas (for non-motorized recreation or wildlife uses, for example) and concentrating development in areas where development is already substantially present (for example, in areas of existing oil and gas development or where motorized recreation is concentrated). This alternative would focus on maintaining the existing nature of undeveloped key or unique areas or habitats (e.g., gypsum soil areas, undisturbed cave/karst areas, shinnery oak [*Quercus havardii*] habitat, DSL habitat, etc.). Additionally, key areas for human use would be “protected” to the extent possible by allowing relatively unfettered access and exclusion of competing uses (e.g., Hackberry Lake Off-highway Vehicle [OHV] Area use, etc.).

2.2.2.6 Alternative C

Alternative C would rely on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas. Competing uses and resource values would continue to occur in the same areas. For example, this alternative theme would rely on timing limitations and Controlled Surface Use (CSU) stipulations for mineral development rather than closing areas to mineral development or requiring No Surface Occupancy (NSO). Another example would be permitting recreational use with accompanying required practices for users instead of closing areas to recreational access or confining that use to a specific area. This alternative would allow the decision maker to determine if it is possible to manage conflict and allow true multiple use without geographically separating “conflicting” uses.

2.2.2.7 Alternative D

This theme is primarily intended to address leasable mineral development, lands and realty, and recreation issues. This alternative would manage resources and resource uses within the mandates of existing laws and regulations without additional restrictions. This alternative may focus on maximizing leasable mineral development and other commercial uses of the land (such as rights-of-way [ROWs] for wind and solar development and livestock grazing), while at the same time maximizing motorized and non-motorized recreation opportunities. This alternative may include focus areas where the viability of commercial activities would be prioritized over most other resource users/uses. Under this alternative, more areas may be open to leasable mineral development, perhaps with fewer stipulations. Likewise, fewer areas may be closed to motorized recreation or other recreation uses. Under this alternative, VRM designations may tend more toward VRM Class III and IV. Acres available for livestock grazing would be greater than under the other alternatives.

Notes: There are currently no known coal resources in the CFO planning area. Therefore, no alternatives or allocations were developed for coal.

2.3 GENERAL

Mitigation: The CFO would adhere to the tenets of the mitigation hierarchy as defined in CEQ NEPA (40 CFR 1508.20) regulations.

This RMP revision provides for mitigation under all of the alternatives for such resources as karst, water, and special status species.

At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions. monitoring objectives would be developed for soils, wildlife habitat condition, special status species habitat condition, NLCS units, treatment effectiveness, rangeland health and permit renewals, fuels treatment effectiveness, and reclamation effectiveness. However, monitoring objectives are not limited to these resources and land use activities. Additional resources or land use activities, for which monitoring objectives can be developed, may be identified at the implementation phase as needed.

Note: Implementation level decisions proposed for the Draft RMP/EIS can be found in Appendix L – Implementation Level Decisions.

2.4 SOILS

2.4.1 Goals

1. Manage resources and uses to maintain or enhance biological and physical functions and stability of soils.
2. Manage resources and uses to maintain or enhance biological soil crust populations in fragile soils, particularly in gypsum soils.

2.4.2 Objectives

1. Continue to develop and implement BMPs to prevent impairment of soil productivity caused by accelerated wind or water erosion, non-point source pollution, and physical or chemical degradation resulting from surface use activities.

To ensure that mitigation is successful, the BLM would incorporate the best-available science, continually seek better information, use rigorous compliance and effectiveness monitoring, and employ adaptive management.

At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions.

Table 2-1. Alternatives for Soils

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Gypsum Soils area (62,300 acres) would not be designated as an ACEC but would be managed with the prescriptions outlined in Section 2.27, Special Designations ACEC.	The Gypsum Soils area (62,300 acres) would not be designated as an ACEC but would be managed with the prescriptions outlined in Section 2.27, Special Designations ACEC.	The Gypsum Soils ACEC (62,300 acres) would be designated and managed with the prescriptions outlined in Section 2.27, Special Designations ACEC.	The Gypsum Soils ACEC (62,300 acres) would be designated and managed with the prescriptions outlined in Section 2.27, Special Designations ACEC.	The Gypsum Soils ACEC (62,300 acres) would be designated and managed with the prescriptions outlined in Section 2.27, Special Designations ACEC.
There is no management specific to M-Polygons under the No Action Alternative. However, for analysis purposes the M-Polygons are managed as follows for fluid mineral leasing: M-9, Steep Slopes: Open (2,716 acres) M-18, Sensitive Soils: Open (53,123 acres), open with moderate constraints (1,861 acres), open with major constraints (2,065 acres), closed (665 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for leasable minerals would be needed to protect sensitive soils and steep slopes, which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Closed (2,716 acres) M-18, Sensitive Soils: Closed (57,715 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for leasable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Closed (2,716 acres) M-18, Sensitive Soils: Open with major constraints (55,941 acres), Closed to leasing (1,767 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for leasable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Open with major constraints (2,716 acres) M-18, Sensitive Soils: Open (7 acres), open with moderate constraints (55,195 acres), open with major constraints (1,417 acres), closed (1,095 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for leasable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Open with moderate constraints (2,716 acres) M-18, Sensitive Soils: Open (54,945 acres), open with moderate constraints (259 acres), open with major constraints (1,846 acres), closed (665 acres)
There is no management specific to M-Polygons under the No Action Alternative. However, for analysis purposes the M-Polygons are managed as follows for salable mineral leasing: M-9, Steep Slopes: Open (2,716 acres) M-18, Sensitive Soils: Open (54,537 acres), closed (3,177 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for salable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Closed (2,716 acres) M-18, Sensitive Soils: Closed (57,715 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for salable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Closed (2,716 acres) M-18, Sensitive Soils: Closed (57,715 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for salable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Open with special terms and conditions (2,716 acres) M-18, Sensitive Soils: Open with special terms and conditions (55,191 acres), closed (2,569 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for salable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Open with special terms and conditions (2,716 acres) M-18, Sensitive Soils: Open (51,818 acres), closed (2,269 acres)
There is no management specific to M-Polygons under the No Action Alternative. However, for analysis purposes the M-Polygons are managed as follows for locatable mineral leasing: M-9, Steep Slopes: Open (2,716 acres) M-18, Sensitive Soils: Open (56,021 acres), recommended for withdrawal (1,695 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for locatable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Recommended for withdrawal (2,716 acres) M-18, Sensitive Soils: Recommended for withdrawal (57,714 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for locatable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Recommended for withdrawal (2,716 acres) M-18, Sensitive Soils: Recommended for withdrawal (57,714 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for locatable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Open (2,716 acres) M-18, Sensitive Soils: Open (55,636 acres) Recommended for withdrawal (2,078 acres)	The M-Polygons listed below are areas where special mineral management prescriptions for locatable minerals would be needed to protect sensitive soils and steep slopes which are not covered under other prescriptions (Map 2-12). M-9, Steep Slopes: Open (2,716 acres) M-18, Sensitive Soils: Open (55,879 acres) Recommended for withdrawal (1,836 acres)

2.5 WATER RESOURCES

2.5.1 Goals

1. Promote the development and management of water quantity and quality and encourage the treatment of produced water for reuse downhole and other technologies that reduce the demand for usable waters.
2. Maintain or improve the chemical, physical, and biological integrity of both surface and subsurface water resources.

2.5.2 Objectives

1. Maintain or improve water quantity and quality in accordance with federal and state standards.
2. Make progress toward meeting federal and state water quality standards, where these standards are not being met.
3. Attempt to acquire water rights to enhance habitat for wildlife to meet objectives of the Endangered Species Act, and to provide water to enhance range management for recreational opportunities and other appropriate uses on public land.
4. Manage water quality to meet the New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management (BLM 2001).
5. Implement new science and policy, as available, to ensure surface water and groundwater are protected during all phases of exploration, construction, drilling, and/or mining through the installation and routine analysis of a network of groundwater monitoring wells and surface water monitoring stations.

6. Analyze and establish the total maximum daily loads (TMDL) for all known Section 303(d) streams/rivers.
7. Develop and implement a surface water and groundwater monitoring program that would be used to establish a baseline to evaluate short- and long-term water quality and quantity trends.
8. Conduct a playa inventory; assess playa health, vegetation, and productivity; and create a playa management plan (PMP) disclosing playas as habitat and water resources. As additional playas are identified on public land, the BLM would incorporate them into the PMP.

Note: Implementation level decisions for water resources can be found in Appendix L – Implementation Level Decisions.

2.6 CAVE AND KARST RESOURCES

2.6.1 Goals

1. Manage cave and karst resources for preservation and protection for appropriate uses for present and future generations.
2. Manage to maintain karst landscapes in un-fragmented natural form, for the enhancement of groundwater recharge and protection to the extent possible.

2.6.2 Objectives

1. Maintain inventory programs for karst areas within the CFO planning area.
2. Promote stewardship, conservation, and appreciation of cave and karst resources through both internal and external outreach.
3. Maintain and enhance programs that provide opportunities for scientific research of cave and karst resources.
4. Work closely with industry groups and constituents to design and locate developments in a way that would protect karst landscapes and associated values.
5. Prepare outcome-based activity/implementation plans for each designated significant cave or karst area. Management prescriptions would facilitate achievement of their objectives by addressing 1) management (resources, visitors, and facilities), 2) marketing (outreach, information and education, promotion, interpretation, and environmental education), 3) monitoring (social, environmental, and administrative indicators and standards), and 4) administration (regulatory, permit/fee/fiscal, data management, and customer liaison).
6. Ensure White Nose Syndrome national and state guidelines and response plans are being followed and implemented within the field office.
7. Conduct biological inventories in each designated Cave ACEC management area.

To ensure that mitigation is successful BLM would incorporate the best-available science, continually seek better information, use rigorous compliance and effectiveness monitoring, and employ adaptive management.

Cave/karst would be designated and managed with the prescriptions outlined in Section 2.27, Special Designations ACEC.

2.7 VEGETATIVE COMMUNITIES: UPLAND VEGETATION, NOXIOUS WEEDS, AND INVASIVE SPECIES

2.7.1 Goals

1. Manage vegetation communities to promote soil stability, water infiltration, and nutrient cycling and to reduce fire size and intensity.
2. Manage vegetation to enhance and sustain existing, traditional, and commercial uses (grazing, plant collection and sale, fuel wood collection, hunting, seed collection) while maintaining native plant communities.
3. Manage vegetation to restore the resiliency of ecosystem structure and function, reduce fragmentation of habitat for native species, and move toward desired plant communities.
4. Manage vegetation resources to achieve the desired plant community (DPC), ensuring ecological diversity, stability, and sustainability, including the desired mix of vegetation types, structural stages, and landscape/riparian function and provide for livestock grazing and for native plant, fish, and wildlife habitats (see Appendix H for Desired Plant Community for Vegetation).
5. Manage public lands to prevent, eliminate, or control noxious weeds and invasive plants.

2.7.2 Objectives

1. Improve lands in poor ecological condition based on Indicators of Rangeland Health or New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management.
2. Restore and maintain vegetative communities within the CFO planning area to desired states within reference and conditions as noted in U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Ecological Site Descriptions (2010).
3. Improve up to 2.0% of lands in order to provide cover (nesting, protective, escape) for various wildlife species.
4. Emphasize vegetative treatments within areas identified as not meeting New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management (BLM 2001).
5. Manage for vegetation restoration, including control of undesirable and invasive plant infestations (native and non-native species) to achieve healthy, sustainable rangeland ecosystems that support resource values such as, but not limited to, wildlife habitat and functional watersheds.
6. Maintain and/or enhance soil and watershed conditions and vegetation production.
7. Protect special status plant species and their habitats.
8. Minimize or halt the spread of noxious, non-native, and invasive plant species.
9. Control or eliminate existing populations of noxious, non-native, and invasive plant species.
   Monitor the spread of noxious, non-native, and invasive plant species.
10. Manage uses and treat noxious weeds such that there is no net increase in the number of acres containing noxious weeds and reduce the number of noxious weed species present.

To ensure that mitigation is successful, the BLM would incorporate the best-available science, continually seek better information, use rigorous compliance and effectiveness monitoring, and employ adaptive management.

2.7.3 Management Common to All Alternatives

1. In accordance with BLM's National Seed Strategy and the National Pollinator Strategy, seed mixtures used for reclamation would be certified weed-free, contain only USDA Plants county-native species, and include at least two forb species. All seed applications would be approved by BLM prior to application.

Note: Implementation levels decisions for vegetation can be found in Appendix L – Implementation Level Decisions.

At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions.

2.8 RIPARIAN

2.8.1 Goals

1. Implement management strategies that restore degraded riparian communities; protect natural flow requirements; protect water quality; manage for stable, non-eroding banks; and manage for year-round flows where applicable.
2. Maintain, restore, improve, protect, and expand riparian-wetland areas so they are in minimum of proper functioning condition (PFC).

2.8.2 Objectives

1. Establish rotational riparian pastures.
2. Establish administrative use only on routes within riparian areas. This would apply to all motorized and mechanized travel. Foot traffic would be allowed.
3. Modify specific grazing objectives as necessary to restore and improve riparian areas.
4. Conduct watershed enhancement activities for riparian health.
5. Complete large-scale riparian restoration projects.
6. Maintain and/or improve river courses so 100% of the Black and Delaware Rivers riparian areas continue at minimum of PFC.
7. Maintain and improve the BLM-managed portion of the Pecos River in order to achieve minimum of PFC.
8. Maintain and improve the BLM-managed portion of the springs in order to achieve minimum of PFC.
9. Establish and maintain functional relationships between key abiotic and biotic components of riparian ecosystems.

At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions.

Table 2-2. Alternatives for Riparian

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
All springs and seeps in the planning area carry forward 1997 RMP Amendment decisions for stipulations on springs: • Apply NSO stipulation to future oil and gas leases. • Avoid future ROW actions through the riparian habitat areas. • Recommend for withdrawal from mining claim location and close to mineral material disposal and mineral leasing. • Designate closed to OHV use and implement plan to enforce designations. • Restrict geophysical operations to comply with OHV designations. • Restrict surface disturbance including plant collections and camping within the area. • Remove livestock from areas to allow rapid recovery of riparian habitat. Grazing management practices to enhance riparian habitat would be studied and implemented following initial recovery of the habitat areas.	Same as the No Action Alternative except no surface disturbance or occupancy within 984 feet of a spring or seep.	Same as the Alternative A.	In addition to the stipulations that would carry forward from the No Action Alternative, the following would be applied: • Motorized and mechanized travel in spring and seep areas would only be for BLM administrative use and would be OHV limited. • No surface disturbance or occupancy within 984 feet of a spring or seep would be allowed. • Black River would be closed to equestrian traffic. • Implemented decisions in livestock grazing, as in the amended 1988 RMP, have been carried forward into Alternative C; therefore, there would be no decrease on AUMs.	No surface disturbance or occupancy within spring or seep riparian area would be allowed.

2.9 WILDLIFE AND FISH

2.9.1 Goals

1. Manage fish and wildlife habitats to support natural wildlife diversity, reproductive capability, and a healthy, self-sustaining population of wildlife and fish species.
2. Manage public lands to maintain and/or improve habitat for fish and wildlife.
3. Manage all BLM actions or authorized activities to sustain plant, fish, and wildlife populations and their habitats to avoid contributing to the listing of or jeopardizing the continued existence or recovery of special status species and their habitats.

2.9.2 Objectives

1. Increase present levels of upland game nesting and cover habitat throughout the planning area.
2. Maintain and improve shorebird and waterfowl habitat (especially in ACECs).
3. Manage all wildlife habitat within the planning area to provide a diversity of vegetation and habitats.
4. Coordinate with the New Mexico Department of Game and Fish (NMDGF) in the management of wildlife and fisheries habitat. Cooperate with the NMDGF to increase native fish populations and decrease non-native fish populations.
5. Manage for unfragmented blocks of continuous habitat that would provide the life cycle requirements of a variety of wildlife species.
6. Maintain or improve habitat for wildlife by managing uses and activities, and actively restoring native communities.
7. Restore native habitats on a landscape scale.
8. Manage all BLM actions or authorized activities to sustain plant, fish, and wildlife populations and their habitats to avoid contributing to the listing of or jeopardizing the continued existence or recovery of special status species and their habitats.
9. Minimize adverse impacts and mitigate unavoidable impacts to plants, fish, wildlife, and special status species and their habitats from BLM actions and authorized activities (under the National Environmental Policy Act).
10. Maintain and/or improve river courses so 100% of the Black and Delaware River riparian areas are at a minimum of PFC.
11. Maintain and improve the BLM-managed portion of the Pecos River in order to achieve PFC.
12. Increase present levels of upland game nesting and cover habitat throughout the planning area.
13. Maintain and/or improve shorebird and waterfowl habitat throughout the planning area.
14. Protect and enhance habitat for colonial (herons, etc.) birds in southeast New Mexico.
15. Manage all wildlife habitat within the planning area to provide desired vegetation to support wildlife.
16. Consult with the NMDGF in the management of big game habitat.
17. Manage habitat to maintain contiguous, unfragmented habitat blocks and unobstructed corridors wherever possible to provide for the life cycle requirements of a variety of wildlife species. This would include providing for connections to contiguous habitat outside the planning area boundary. (This objective is meant to minimize habitat fragmentation, provide the largest possible fragments and/or contiguous corridors, and maintain wildlife movement to the degree possible with existing development.)
18. Maintain or improve habitat for big game species by managing uses and activities, and actively restoring native communities.
19. Restore native habitats while considering vegetation cover types and water needs on a landscape scale.
20. Maintain and approve river and spring courses so 100% of riparian areas are at PFC.
21. Allow for native fish stocking (in conjunction with the NMDGF and U.S. Fish and Wildlife Service [USFWS]) where necessary to sustain or increase native biodiversity.
22. Allow for removal of non-native plant species and aquatic organisms from streams, ponds, and lakes.
23. Manage fisheries habitat to provide for a diversity of habitats and sustainable sport fisheries.
24. Cooperate with the NMDGF to manage habitat to increase native fish populations and decrease non-native fish populations throughout the planning area.
25. Place special emphasis on the protection, maintenance, and enhancement of 1) crucial habitats for big game, upland game birds, and waterfowl; 2) crucial habitats for nongame species of special interest and concern to state or other federal agencies; 3) wetland and riparian habitat; and 4) habitat for state or federally listed (threatened and endangered) species.
26. In cooperation with the NMDGF, identify areas for transplant of large game species. Actions would be in compliance with the BLM 6840 and BLM 1745 manuals.
27. Provide sufficient vegetation and cover for wildlife on their seasonal habitat.
28. Incorporate vegetation and cover requirements into coordinated management plans, which would be specific to primary wildlife use areas.
29. Generally, design range improvements to achieve both wildlife and other rangeland resource objectives.
30. Reintroduce native fauna only after the suitability has been assessed and coordination with the appropriate state and federal agencies has occurred.
31. Increase aquatic habitat diversity in order to maintain and improve native aquatic organisms, attain streambank cover of 70% (for areas conducive for vegetation), and reduce streambank soil alteration to lengthen the period of higher base flows by 2025.
32. Use herbicides as indicated in the Final Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement (BLM 2007a). Buffer distances may be adjusted on a case-by-case basis. Avian surveys would be required for all sprays and would adhere to the tenets of the Migratory Bird Treaty Act (MBTA).
33. Minimize noise pollution where needed to protect wildlife and recreation.
34. Maintain shinnery oak dune plant grassland and mixed desert shrub community types in the planning area for special status species and sensitive species requiring this habitat type.

At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions.

Table 2-3. Alternatives for Wildlife and Fish

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Birds of Prey Grasslands (349,355 acres), Pecos Bluntnose Shiner (201 acres), and Desert Heronries (48,711 acres) would not be managed as ACECs. Please see Section 2.27, Special Designations ACEC for more information as to how the areas would be managed. The Pecos Bluntnose Shiner critical habitat (201 acres) would be managed as an SMA and according to USFWS Recovery Plan guidelines. This would include livestock adjustments and restricted surface disturbance. The Phantom Banks Heronries would be managed as an SMA with the following prescriptions: • Close to mineral material disposal within a 1/4-mile circumference of active heronry. • Designate limited to ORV use and implement plan to protect active heronries through seasonal limitations to designated routes. • Restrict geophysical operations to comply with limited ORV designations. • Restrict surface disturbances including hunting and camping activities. • Apply seasonal restriction of oil and gas activities within a 1/4-mile radius of active heronry.	The Birds of Prey Grasslands ACEC (349,355 acres) and the Pecos Bluntnose Shiner ACEC (201 acres) would be designated under this alternative. Please see Section 2.27, Special Designations ACEC for more information on how the ACECs would be managed.	The Birds of Prey Grasslands ACEC (349,255 acres), the Desert Heronries ACEC (48,711 acres) and the Pecos Bluntnose Shiner ACEC (201 acres) would be designated under this alternative. Please see Section 2.27, Special Designations ACEC for more information on how the ACECs would be managed.	The Pecos Bluntnose Shiner ACEC (201 acres) would be designated under this alternative. Please see Section 2.27, Special Designations ACEC for more information on how the ACEC would be managed.	Same as Alternative C.

2.10 SPECIAL STATUS SPECIES

2.10.1 Goals

1. Manage public lands to contribute to the conservation and recovery of special status species and the ecosystems on which they depend.
2. Continue to enhance population viability and habitats of special status species after delisting to prevent future listings.

2.10.2 Objectives

1. Protect and enhance endangered, threatened, and sensitive species habitats in order to maintain or enhance populations within the planning area. Enhance, restore, and/or maintain habitat conditions and availability for special status species, and prevent loss of habitat. Avoid, minimize, rectify, and reduce or eliminate impacts over time and compensate for any remaining residual effects.
2. To prevent the need to list species under the Endangered Species Act, identify, maintain, protect, and enhance habitats of a) BLM special status species that are not listed by USFWS or NMDGF as endangered, threatened, candidate, or experimental population, non-essential; b) New Mexico State Species of Greatest Conservation Need, and c) species listed by the New Mexico Rare Plant Technical Council.
3. Allow and/or participate in research of threatened and endangered and sensitive species and their habitats.
4. Avoid, minimize, compensate, and reduce long-term habitat fragmentation to return areas to productive levels.
5. Manage sensitive species and the habitats upon which they depend in such a manner as to preclude the need to list them as either threatened or endangered under the Endangered Species Act. The guidance for this management is put forth in BLM Manual 6840.
6. Implement the specific goals and objectives of recovery plans, conservation agreements and strategies, and approved activity level plans. The BLM would continue to work with the USFWS and others to ensure that plans and agreements are updated as necessary to reflect the latest scientific data.
7. Focus on partnerships with agencies and industry to develop innovative new strategies to address ecosystem management while providing for valid existing rights and multiple use.
8. Identify broad-scale conservation measures for listed species that would be applied to future projects.

To ensure that mitigation is successful, the BLM would incorporate the best-available science, continually seek better information, use rigorous compliance and effectiveness monitoring, and employ adaptive management.

Landscape-scale monitoring: At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions Note: Implementation-level decisions for special status species can be found in Appendix L – Implementation Level Decisions.

2.10.3 Special Status Species – Aquatic Species

2.10.3.1 Goals

1. Manage public lands to contribute to the conservation and recovery of special status species and the ecosystems on which they depend.
2. Continue to enhance population viability and habitats of special status species after delisting to prevent future listings.

2.10.3.2 Objectives

1. Protect and enhance threatened, endangered, and sensitive species' habitats in order to maintain or enhance populations within the planning area. Enhance, restore, and/or maintain habitat conditions and availability for special status species and prevent all avoidable loss of habitat.
2. Identify, maintain, protect, and enhance habitats of BLM sensitive and New Mexico State sensitive aquatic species to prevent the need to list these species under the Endangered Species Act.
3. Allow and/or participate in research of threatened and endangered and sensitive species and their habitats.
4. Manage non-listed sensitive species and the aquatic and associated habitats upon which they depend in such a manner as to preclude the need to list them as either threatened or endangered under the Endangered Species Act. The guidance for this management is put forth in BLM Manual 6840.
5. Implement the specific goals and objectives of recovery plans, conservation agreements and strategies, and approved activity-level plans. The BLM would continue to work with the USFWS and others to ensure that plans and agreements are updated as necessary to reflect the latest scientific data.
6. Focus on partnerships with agencies and industry to develop innovative new strategies to address ecosystem management while providing for valid existing rights and multiple use.
7. Identify broad-scale conservation measures for listed species that would be applied to future projects.
8. Increase aquatic habitat diversity, attain streambank cover of 70%, and reduce streambank soil alteration to lengthen the period of higher base flows by 2025.

Note: Please see Section 2.27, Special Designations ACEC for information on the Bluntnose Shiner Habitat ACEC.

2.10.4 Special Status Species – Plants

2.10.4.1 Goals

1. Manage public lands to contribute to the conservation and recovery of special status species and the ecosystems on which they depend.
2. Continue to enhance population viability and habitats of special status species before listing is warranted.

2.10.4.2 Objectives

1. Provide for expansion of known populations of gypsum wild buckwheat (*Eriogonum gypsophilum*) by buffering (exclude surface-disturbing activities) 984 feet around known populations (See Appendices C and T).
2. Protect and enhance endangered, threatened, and sensitive species' habitats in order to maintain or enhance populations within the planning area. Enhance, restore, and/or maintain habitat conditions and availability for special status species and prevent all loss of habitat.
3. To prevent the need to list these species under the Endangered Species Act, identify, maintain, protect, and enhance habitats of a) BLM special status species that are not listed by USFWS or NMDGF as endangered, threatened, candidate, or experimental population, non-essential, and b) species listed by the New Mexico Rare Plant Technical Council.
4. Allow and/or participate in research of threatened, endangered, and sensitive species and their habitats.
5. Mitigate or reduce long-term habitat fragmentation through avoidance, mitigation, rectification, site-specific reclamation, reducing or eliminating impacts over time, and compensating for remaining residual effects to return areas to productive levels.
6. Manage non-listed sensitive species and the habitats upon which they depend in such a manner as to preclude the need to list them as either threatened or endangered under the Endangered Species Act. The guidance for this management is put forth in BLM Manual 6840.
7. Implement the specific goals and objectives of recovery plans, conservation agreements and strategies, and approved activity-level plans. The BLM would continue to work with the USFWS and others to ensure that plans and agreements are updated as necessary to reflect the latest scientific data.
8. Focus on partnerships with agencies and industries to develop innovative new strategies to address ecosystem management while providing for valid existing rights and multiple use.
9. Identify broad-scale conservation measures for listed species that would be applied to future projects.

2.10.4.3 Management Common to All Action Alternatives

1. In accordance with BLM's National Seed Strategy and the National Pollinator Strategy, seed mixtures used for reclamation would be certified weed-free, contain only USDA Plants county-native species, and include at least two forb species. All seed applications would be approved by BLM prior to application.
2. Long-term species status trend monitoring: At the implementation phase, after the record of decision for the RMP has been signed, special status plant species would be prioritized by threat, and recovery objectives would be identified. Monitoring objectives would include status thresholds, monitoring indicators, status determination methods, and an implementation schedule. The data would be used to determine recovery status and inform management decisions.

Table 2-4. Alternatives for Special Status Plants

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Gypsum wild-buckwheat would be managed as closed or excluded to leasable, salable, locatable, geothermal, wind, solar and ROW development.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative except leasable development would be managed as open with major constraints.	Same as Alternative C.

2.10.5 Special Status Species – Wildlife

2.10.5.1 Goals

1. Manage public lands to contribute to the conservation and recovery of special status species and the ecosystems on which they depend.
2. Continue to enhance population viability and habitats of special status species before listing is warranted.

2.10.5.2 Objectives

1. Protect and enhance endangered, threatened, and sensitive species' habitats in order to maintain or enhance populations within the planning area. Enhance, restore, and/or maintain habitat conditions and availability for special status species, and prevent all avoidable loss of habitat.
2. To prevent the need to list these species under the Endangered Species Act, identify, maintain, protect, and enhance habitats of a) BLM special status species that are not listed by USFWS or NMDGF as endangered, threatened, candidate, or experimental population, non-essential, and b) New Mexico State Species of Greatest Conservation Need.
3. Allow and/or participate in research of threatened and endangered and sensitive species and their habitats.
4. Mitigate or reduce long-term habitat fragmentation through avoidance and site-specific reclamation to return areas to productive levels.
5. Manage non-listed sensitive species and the habitats upon which they depend in such a manner as to preclude the need to list them as either threatened or endangered under the Endangered Species Act. The guidance for this management is put forth in BLM Manual 6840.
6. Implement the specific goals and objectives of recovery plans, conservation agreements and strategies, and approved activity-level plans. The BLM would continue to work with the USFWS and others to ensure that plans and agreements are updated as necessary to reflect the latest scientific data.
7. Focus on partnerships with agencies and industry to develop innovative new strategies to address ecosystem management while providing for valid existing rights and multiple use.
8. Identify broad-scale conservation measures for listed species that would be applied to future projects.

Note: For information on wildlife ACECs, please see Section 2.27, Special Designations ACEC.

2.10.5.3 Management Common to All Alternatives

For projects involving surface occupancy, soil disturbance, and/or alteration to biological and physiographic landscape features within or adjacent to BLM special status plant species' known occupied habitats and suitable habitats, botanical surveys conducted by a qualified field botanist and an environmental analysis would be required for the proposed action. The survey(s) would be conducted while plants are detectible, and projects may be delayed in excess of 60 days to survey for species during their blooming season. If BLM special status plant species, as listed at the time of the proposed project, are found in or near the proposed disturbance areas, appropriate conservation measures may be required to avoid or minimize impacts to those species. Such measures may include avoidance buffers in excess of 656 feet (See Appendices C and T).

2.10.5.4 Timing Limitation Stipulation/Condition of Approval for Lesser Prairie-Chicken

Oil and gas activities, including 3-D geophysical exploration and drilling, would not be allowed in LPC habitat from March 1 through June 15 annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, geophysical exploration other than 3-D operations, and pipeline, road, and well pad construction, would be allowed except between 3:00 a.m. and 9:00 a.m. The 3:00 a.m. to 9:00 a.m. restriction would not apply to normal, around-the-clock operations such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling would be allowed within up to 656 feet of leks known at the time of permitting. Normal vehicle use on existing roads would not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 49 decibels (dB) measured at 30 feet from the source of the noise. These stipulations are intended to prevent disruption of mating and nesting by activities associated with energy exploration and development. Stipulations would be imposed in areas where the species is present.

The Lesser Prairie Chicken Primary Population Area would be closed to leasable, locatable, salable, ROWs and would be excluded from wind and solar development and closed to geothermal development.

2.10.5.5 Habitat Area Criteria

To be considered a habitat area, the area must meet the occupancy criteria or the vegetation and development/fragmentation criteria (or all three). Habitat areas for the LPC and the Aplomado falcon (*Falco femoralis*) are delineated in Map 3-9 in Appendix B.

Occupancy of LPC: The area must have evidence of LPC within the last 3 years and/or documented historic sightings.

Vegetation: Areas must be within the shinnery oak-dune plant community and provide the vegetative composition necessary for seasonal habitat requirements (i.e., nesting, brood-rearing, and winter thermal cover). If composition of vegetation is sufficient but may lack standing biomass, then those issues would be addressed in coordination, consultation, and cooperation with the permittee.

Development and fragmentation: The areas being evaluated must contain a minimum "patch" size of 320 acres of federal minerals that is not affected by fragmentation, which is defined by impact radii.

Table 2-5. Robel Impact Distances

Disturbance	Impact Radius
Oil or gas well heads	0.1 mile
Sand/dirt two-track roads	0 miles
Caliche roads, oil field access roads	0.1 mile
Paved roads	0.5 mile
Compressor stations	0.75 mile
Houses	0.5 mile
Power lines	0.25 mile
Center-pivot fields	0.25 mile
To assess the criteria, the following data are needed: 1. Presence of LPC (last 3 years). 2. Percent vegetative composition (i.e., shrubs, grasses, forbs). 3. Vegetative condition (range condition, visual obstruction readings, and production). 4. Range site description. 5. Are there areas within the polygon that are larger than 320 acres? 6. Estimate level of development (low, mid, high) within and adjacent to the habitat polygon. 7. Evaluate the amount of Robel impact radii on suitable habitat (pads, roads, power lines, compressors). 8. Documented historical lekking activity.	

Table 2-6. Alternatives for Wildlife

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The LPC Isolated Population Area (IPA) (approximately 629,700 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with moderate constraints (624,515 acres), open with major constraints (5,197 acres) • Salables: Open (624,866 acres), closed (4,810 acres) • Locatables: Open • Renewables: Open for wind (499,585 acres), avoid for wind (23,073 acres), variance for solar (53,760 acres), exclude to solar (469,086 acres), open to geothermal (189 acres), closed to geothermal (1,400 acres) • ROW: Open (517,052 acres), avoid (4,811 acres)	The LPC IPA (approximately 629,700 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with moderate constraints (624,252 acres), open with major constraints (5,476 acres) • Salables: Open with standard terms and conditions (39 acres), open with special terms and conditions (619,944 acres), closed (9,748 acres) • Locatables: Open (922,953 acres), recommended for withdrawal (6,774 acres) • Renewables: Open for wind (153 acres), avoid for wind (516,350 acres), excluded for wind (6,774 acres), variance for solar (509,381 acres), exclude to solar (13,258 acres), open to geothermal (107,833 acres), closed to geothermal (0 acre) • ROWs: Open (68 acres), avoid (515,037 acres), exclude (6,774 acres)	The LPC IPA (approximately 629,700 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open to with moderate constraints (299,947 acres), open with major constraints (17,312 acres), closed (312,472 acres) • Salables: Open with special terms and conditions (353,770 acres), closed (275,960 acres) • Locatables: Open (355,893 acres), recommended for withdrawal (273,832 acres) • Renewables: Open for wind (202 acres), avoid for wind (298,171 acres), exclude from wind (224,901 acres), variance for solar (485,316 acres), exclude to solar (37,318 acres), open to geothermal (50,628 acres), closed to geothermal (57,162 acres) • ROWs: Open (70 acres), avoid (291,645 acres), exclude (230,157 acres)	The LPC IPA (629,700 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (192,662 acres), open with moderate constraints (431,126 acres), open with major constraints (5,924 acres) • Salables: Open with standard terms and conditions (1947,724 acres), open with special terms and conditions (425,476 acres), closed (9,527 acres) • Locatables: Open (623,804 acres), recommended for withdrawal (5,924 acres) • Renewables: Open for wind (167,424 acres), avoid for wind (349,300 acres), exclude for wind (6,548 acres), variance for solar (507,535 acres), exclude to solar (15,098 acres), open to geothermal (107,825 acres) • ROWs: Open (506,772 acres), avoid (9,174 acres), excluded (5,924 acres)	The LPC IPA (629, 700 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (309,197 acres), open to with moderate constraints (314,610 acres), open with major constraints (5,924 acres) • Salables: Open with standard terms and conditions (310,131 acres), open to salable mineral development with special terms and conditions (310,068 acres), closed (9,527 acres) • Locatables: Open (623,764 acres), recommended for withdrawal (5,924 acres • Renewables: Open for wind (167,427 acres), avoid for wind (349,305 acres), exclude for wind (6,548 acres), variance for solar (507,534 acres), exclude to solar (15,105 acres), open to geothermal (107,830 acres) • ROWs: Open (507,990 acres), avoid (7,965 acres), excluded (5,924 acres)
The LPC timing area (approximately 406,660 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (18,753 acres), open with moderate constraints (254,044 acres), open with major constraints (14,823 acres), closed (119,018 acres) • Salables: Open (352,423 acres), closed (54,208 acres) • Locatables: Open • Renewables: Open for wind (267,458 acres), avoid for wind (9,536 acres), variance for solar (53,760 acres), exclude to solar (276,994 acres) • ROW: Open (275,073 acres), avoid (1,894 acres)	The LPC timing area (approximately 406,660 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (11,045 acres), open with moderate constraints (261,748 acres), open with major constraints (1,065 acres), closed (132,804 acres) • Salables: Open (10,838 acres), open with special terms and conditions (259,876 acres), closed (135,948 acres) • Locatables: Open (271,496 acres), recommended for withdrawal (135,164 acres) • Renewables: Open for wind (387 acres), avoid for wind (206,250 acres), exclude to wind (70,337 acres), variance for solar (206,990 acres), exclude to solar (69,986 acres), open to geothermal (64,839 acres), closed to geothermal (64,829 acres) • ROW: Avoid (206,638 acres), exclude (70,337 acres)	The LPC timing area (approximately 406,660 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (11,045 acres), open with moderate constraints (261,748 acres), open with major constraints (1,065 acres) • Salables: Open (10,816 acres), open with special terms and conditions (248 acres), closed (395,597 acres) • Locatables: Open (11,055 acres), recommended for withdrawal (395,602 acres) • Renewables: Avoid for wind (821 acres), withdrawn for wind (276,148 acres) variance for solar (197,411 acres), exclude to solar (79,559 acres), open to geothermal (11,045 acres), closed to geothermal (118,583 acres) • ROW: Avoid (3,426 acres), exclude (273,531 acres)	The LPC timing area (approximately 406,660 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (18,165 acres), open with moderate constraints (253,314 acres), open with major constraints (82,845 acres), closed (52,315 acres) • Salables: Open (11,089 acres), open with special terms and conditions (258,993 acres), closed (136,578 acres) • Locatables: Open (351,346 acres), recommended for withdrawal (55,315 acres) • Renewables: Avoid for wind (206,006 acres), exclude from wind (70,961 acres) variance for solar (206,359 acres), exclude to solar (70,610 acres), open to geothermal (64,836 acres), closed to geothermal (64,839 acres) • ROW: Open (205,223 acres), avoid (1,407 acres), exclude (70,337 acres)	The LPC timing area (approximately 406,660 acres) (Map 3-9) would be managed with the following prescriptions: • Leasables: Open with standard terms and conditions (11,050 acres), open with moderate constraints (340,302 acres), open with major constraints (2,999 acres) • Salables: Open (11,048 acres), open with special terms and conditions (336,577 acres), closed (59,034 acres) • Locatables: Open (351,346 acres), recommended for withdrawal (55,315 acres) • Renewables: Avoid for wind (272,217 acres), exclude from wind (4,758 acres), variance for solar (206,359 acres), exclude to solar (70,614 acres), open to geothermal (64,838 acres), closed to geothermal (64,827 acres) • ROW: Open (205,224 acres), avoid (67,617 acres), exclude (4,134 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Aplomado Falcon Habitat is managed in three levels: Level I (98,540 acres) is habitat that is within Grasslands area but does not meet the characteristics of habitat for the falcon. Level II (125,284 acres) does meet falcon habitat characteristics and additional management restrictions would be applied. Level III (17,310 acres) is the best habitat and would be deferred from leasing in the No Action Alternative. See management prescriptions for each level below.				
Aplomado Falcon Habitat (Map 3-9) would be managed with the following prescriptions: Leasables: • Level 1 – Open with moderate constraints (98,540 acres) • Level 2 – Open with moderate constraints (125,284 acres) • Level 3 – Open with moderate constraints (781 acres) • Closed (16,529 acres) Salables: • Level 1 – Open (98,539 acres) • Level 2 – Open (125,277 acres) • Level 3 – Open 17,310 acres Locatables: • Level 1 – Open (98,540 acres) • Level 2 – Open (125,284 acres) • Level 3 – Open (17,310 acres) ROWs: • Level 1 – Open (57,887 acres) • Level 2 – Open (93,186 acres) • Level 3 – Open (11,007 acres) Wind: • Level 1 – Open (45,406 acres), Avoid (12,481 acres) • Level 2 – Open (28,140 acres), Avoid (65,045 acres) • Level 3 – Open (6,829 acres), Avoid (4,178 acres) Solar: • Level 1 – Exclude (57,889 acres) • Level 2 – Variance (3402 acres), Exclude (89,786 acres) • Level 3 – Exclude (11,007 acres)	Aplomado Falcon Habitat (Map 3-9) would be managed with the following prescriptions: Leasables: • Level 1 – Open with moderate constraints • Level 2 – Closed • Level 3 – Closed Salables: • Level 1 – Open with special terms and conditions • Level 2 – Closed • Level 3 – Closed ROWs: • Level 1 – Avoidance area • Level 2 – Excluded • Level 3 – Excluded Wind: • Excluded for all levels Geothermal: • Closed for all levels	Aplomado Falcon Habitat (Map 3-9) would be managed with the following prescriptions: Leasables: • Level 1 – Closed • Level 2 – Closed • Level 3 – Closed Salables: • Level 1 – Closed • Level 2 – Closed • Level 3 – Closed ROWs: • Level 1 – Excluded • Level 2 – Excluded • Level 3 – Excluded Wind: • Excluded for all levels Geothermal: • Closed for all levels	Aplomado Falcon Habitat (Map 3-9) would be managed with the following prescriptions: Leasables: • Level 1 – Open with standard terms and conditions • Level 2 – Open with moderate constraints • Level 3 – Open with moderate constraints Salables: • Level 1 – Open with standard terms and conditions • Level 2 – Open with special terms and conditions • Level 3 – Open with special terms and conditions ROWs: • Level 1 – Open • Level 2 – Avoidance area • Level 3 – Avoidance area Wind: • Avoidance area for all levels Geothermal: • Level 1 – Open • Level 2 – Closed • Level 3 – Closed	Aplomado Falcon Habitat (Map 3-9) would be managed with the following prescriptions: Leasables: • Level 1 – Open with standard terms and conditions • Level 2 – Open with moderate constraints • Level 3 – Open with moderate constraints Salables: • Level 1 – Open with standard terms and conditions • Level 2 – Open with special terms and conditions • Level 3 – Open with special terms and conditions ROWs: • Level 1 – Open • Level 2 – Avoidance area • Level 3 – Avoidance area Wind: • Open for all levels Geothermal: • Level 1 – Open • Level 2 – Closed • Level 3 – Closed

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Dunes Sagebrush Lizard (DSL) habitat (196,304 acres) (Map 3-10) would be managed with the following prescriptions: • Open to leasable mineral development with moderate constraints (156,623 acres), Open with major constraints (10,074 acres), closed (29,607 acres). • Open to salable mineral development with standard terms and conditions (193,748 acres), closed (2,546 acres) • Open to locatable development • Open for ROWs (161,944 acres), avoid (111 acres) • Open for wind development (148,895 acres), avoid (13,172 acres) • Variance for solar (584 acres), excluded (161,486 acres)	Dunes Sagebrush Lizard (DSL) habitat (196,307 acres) (Map 3-10) would be managed with the following prescriptions: • Open to leasable mineral development with moderate constraints (155,949 acres), open with major constraints (81 acres), closed (40,277 acres) • Open to salable mineral development with special terms and conditions (152,991 acres, closed (43,316 acres) • Open to locatable mineral development (155,949 acres), recommended for withdrawal (40,357 acres) • Avoidance area for ROWs (128,736 acres), excluded (33,328 acres) • Avoidance area for wind development (128,736 acres), excluded (33,328 acres) • Variance for solar (125,787 acres), excluded (36,277 acres)	Dunes Sagebrush Lizard (DSL) habitat (196,307 acres) (Map 3-10) would be managed with the following prescriptions: • Closed to leasable mineral development • Open to salable mineral development with special terms and conditions (55,138 acres), closed (141,169 acres) • Recommended for withdrawal from locatable mineral development • Avoidance area for ROWs (51,075 acres), excluded (110,986 acres) • Avoidance area for wind development (49,155 acres), excluded (112,907 acres) • Variance for solar (122,653 acres), excluded (39,409 acres)	Dunes Sagebrush Lizard (DSL) habitat (196,304 acres) (Map 3-10) would be managed with the following prescriptions: • Open to leasable mineral development with moderate constraints (155,947 acres), open with major constraints (37,922 acres), closed (2,435 acres) • Open to salable mineral development with special terms and conditions (152,392 acres), closed (43,915 acres) • Open to locatable mineral development (193,680 acres), recommended for withdrawal (2,626 • Open to ROWs (125,178 acres), avoid (3,551 acres), excluded (33,328 acres) • Avoidance area for wind development (128,138 acres, excluded (33,920 acres) • Variance for solar (125,188 acres), excluded (36,869 acres)	Dunes Sagebrush Lizard (DSL) habitat (196,307 acres) (Map 3-10) would be managed with the following prescriptions: • Open to leasable mineral development with moderate constraints (193,681 acres), open with major constraints (191 acres), closed (2,435 acres) • Open to salable mineral development with special terms and conditions (187,826 acres), closed (8,479 acres) • Open to locatable mineral development 193,680 acres), recommended for withdrawal (2,626 acres) • Open to ROWs (125,179 acres), avoid (36,684 acres), excluded (201 acres) • Avoidance area for wind development (161,271 acres, excluded (793 acres) • Variance for solar (125,188 acres), excluded (36,876 acres)

2.11 WILDLAND FIRE MANAGEMENT

2.11.1 Goals

1. Manage fuels and wildland fires to protect life and property and to protect or enhance resource values.
2. Minimize economic cost of unplanned fires that includes after effects of fires, such as burned equipment (e.g., flow line, potential hazardous materials).

2.11.2 Objectives

1. Provide for firefighter and public safety in all aspects of wildland fire management.
2. Provide appropriate response to all wildland fires based on resource values to be protected and values at risk.
3. Maintain or return vegetative communities outside the wildland urban interface (WUI) to their historic fire regime and to Fire Regime Condition Class (FRCC).
4. Develop and support community assistance projects and plans.
5. Implement emergency stabilization, rehabilitation, and restoration efforts to protect and sustain resources, public health and safety, and community infrastructure.

2.11.3 Management Common to All

1. All unplanned ignitions would be suppressed in areas where there is oil and gas infrastructure. Fires outside oil and gas fields would be managed using the full range of management responses.
2. At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions.

Note: Implementation level decisions for wildland fire management can be found in Appendix L – Implementation Level Decisions.

2.12 CULTURAL RESOURCES

2.12.1 Goals

1. Identify, protect, and preserve significant cultural resources eligible to the National Register of Historic Places (NRHP) from natural and human-caused impacts to ensure they are available for appropriate uses by present and future generations.
2. Consult further with Native American tribes in the identification of traditional cultural properties (TCPs) and sacred sites.
3. Advance archaeological and anthropological research in southeastern New Mexico through the Permian Basin Programmatic Agreement.
4. Promote cultural resources through outreach and educational programs.

2.12.2 Objectives

1. Identify those cultural resources that would contribute to the archaeological knowledge of the region with thorough scientific documentation and analyses so that eligibility can be confidently assigned.
2. Develop management plans for those properties that are highly significant but are not designated as ACEC.
3. Develop proactive mitigation and monitoring strategies for impacts to significant cultural resources.
4. Develop agreements with interested Native American tribes to identify the types of actions with which they are concerned, and the level of consultation in which they wish to participate.
5. Promote participation in the Permian Basin Programmatic Agreement through regular education and outreach to the oil, gas, and potash industries.
6. Formulate research projects of the Permian Basin Programmatic Agreement so that the questions identified in the Regional Research Design may be answered and the methods of cultural resource management in the planning area are improved.
7. Develop programs of public outreach within educational, cultural, or avocational groups.
8. Develop partnerships in the community that would support and further education of heritage preservation.

Note: Implementation level decisions for cultural resources can be found in Appendix L – Implementation Level Decisions.
Note: Information on cultural resources ACECs can be found in Section 2.27, Special Designations ACEC.

2.13 PALEONTOLOGICAL RESOURCES

2.13.1 Goals

1. Ensure that significant fossils are not inadvertently damaged, destroyed, or removed from public ownership as a result of approved land uses such as surface disturbance, recreation, or land exchanges.
2. Foster public awareness and appreciation of the paleontological heritage by promoting the scientific and educational uses of fossils.

2.13.2 Objectives

1. Inventory, identify, record, evaluate, manage, and protect paleontological resources for scientific research, educational purposes, and public outreach.
2. Protect paleontological resources from surface-disturbing activities by conducting inventory in high-potential paleontological areas such as the Delaware River Corridor.
3. Protect and preserve important paleontological resource and highlight opportunities for public education.
4. Development of management direction such as that identified below would achieve desired resource protection by assuring that use restrictions are in place prior to authorizing surface-disturbing activities; management recommendations are developed to promote the scientific, educational, and recreational uses of fossils resources; and threats are identified and mitigated as appropriate.
5. Implement the Potential Fossil Yield Classification system.
6. Complete and maintain an inventory of fossil localities and monitor known occurrences.
7. Promote partnerships and inform and educate the public about the protection of fossil resources.

Note: Implementation level decisions for paleontological resources can be found in Appendix L – Implementation Level Decisions.

2.14 LANDS WITH WILDERNESS CHARACTERISTICS

2.14.1 Goals

1. Maintain wilderness characteristics as appropriate, considering manageability and the context of competing resource demands.

2.14.2 Objectives

1. Manage certain lands with wilderness characteristics (LWCs) to retain their size, naturalness, and outstanding opportunities for solitude or primitive recreation; manage certain LWCs for other resource purposes and forgo their wilderness characteristics.

LWCs were assigned to alternatives based on how they met what each alternative seeks out to address. Alternative C seeks to rely on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas. Alternative A seeks to prioritize watershed management and restoration-related planning issues. Alternative B seeks to address resource user or resource use conflicts related to leasable mineral development, recreation, and watershed management. The LWCs not within the preferred alternative (Alternative C) fell outside of or did not line up well with the goals of this alternative. Please note that under LWCs to be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics, BLM would manage to emphasize and allow for mineral and renewable energy development, land use authorizations, livestock grazing and recreation, among other uses as a priority over protecting wilderness characteristics.

Table 2-7. Alternatives for Lands with Wilderness Characteristics

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
There would be no units managed to protect their wilderness characteristics (0 acres). Please see individual unit prescriptions below.	Alternative A seeks to prioritize watershed management and restoration-related planning issues. Alternative A includes all of the units determined to possess wilderness characteristics because LWCs management lends itself to protecting watershed health. The following units would be managed to protect their wilderness characteristics as a priority over multiple uses while meeting the objectives of this alternative (Map 2-3): • Unit 801 – 81 acres (adjacent to Lonesome Ridge Wilderness Study Area [WSA]) • Unit 803A – 1,139 acres (Lechuguilla South) • Unit 810B – 6,730 (Texas Hill South) • Unit 810 – 18,381 acres (Texas Hill North) • Unit 815 – 3,989 acres (Slaughter and Double Canyons) • Unit 902 – 9,834 (Big Ox Yoke) • Unit 909 – 9,130 acres (Salt House Draw) • Unit 922 – 5,751 acres (Thurman Draw) • Unit 813 – 8,504 acres • Unit 810A – 1,007 acres • Unit 125 – 2,120 acres The following units would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics while meeting the objectives of this alternative. (Map 2-4): • None The following units would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • None	Alternative B seeks to address resource user or resource use conflicts related to leasable mineral development, recreation, and watershed management. Alternative B includes all of the units within or in proximity to the citizen proposals submitted by the New Mexico Wilderness Alliance based on their inventory information. The following units would be managed to protect their wilderness characteristics while meeting the objectives of this alternative (Map 2-4): • Unit 801 – 82 acres (adjacent to Lonesome Ridge WSA) • Unit 803A – 1,139 acres (Lechuguilla South) • Unit 810B – 6,730 acres (Texas Hill South) • Unit 810 – 18,381 (Texas Hill North) • Unit 815 – 3,898 acres (Slaughter and Double Canyons) • Unit 922 – 5,751 acres (Thurman Draw) • Unit 813 – 8,503 acres • Unit 810A – 1,007 acres • Unit 125 – 2,120 acres The following units would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics while meeting the objectives of this alternative (Map 2-4): • None The following units would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • Unit 902 – (9,834 acres (Big Ox Yolk) • Unit 909 – (9,130 acres (Salt House Draw)	Alternative C seeks to rely on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas. Alternative C includes the units that are not encumbered by oil and gas leases or, if leased, the lease is stipulated NSO. The following units would be managed to protect their wilderness characteristics while meeting the objectives of this alternative (Map 2-5): • Unit 801 – 82 acres (Adjacent to Lonesome Ridge WSA) • Unit 803A – 1,139 acres (Lechuguilla South) • Unit 815 – 3,898 acres (Slaughter and Double Canyons) The following units would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics while meeting the objectives of this alternative (Map 2-4): • Unit 902 – 9,834 acres (Big Ox Yoke) • Unit 909 – 9,130 acres (Salt House Draw) • Unit 813 – 8,504 acres • Unit 810A – 1,007 acres • Unit 125 – 2,120 acres The following units would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • Unit 810 – 18,381 acres (Texas Hill North) • Unit 810B – 6,730 acres (Texas Hill South) • Unit 922 – 5,751 acres (Thurman Draw)	Alternative D includes only those units that are adjacent to existing WSAs or adjacent to National Park Service wilderness and were not encumbered by an oil and gas lease. The following units would be managed to protect their wilderness characteristics while meeting the objectives of this alternative (Map 2-6): • Unit 801 – 82 acres (Adjacent to Lonesome Ridge WSA) • Unit 803A – 1,139 acres (Lechuguilla South) The following units would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics while meeting the objectives of this alternative (Map 2-4): • None The following units would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • Unit 810A – 1,007 acres • Unit 125 – 2,120 acres • Unit 810B – 6,730 acres (Texas Hill South) • Unit 810 – 18,381 acres (Texas Hill North) • Unit 909 – 9,130 acres (Salt House Draw) • Unit 813 – 8,504 acres • Unit 815 – 3,898 acres (Slaughter and Double Canyons) • Unit 902 – 9,834 acres (Big Ox Yoke) • Unit 922 – 5,751 acres (Thurman Draw)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Unit 801 would not be managed as LWCs. It would be managed with the following prescriptions: **Unit 801 (81 acres):** • **Leasables:** Open with major constraints • **Salables:** Closed • **Locatables:** Open (41 acres); recommended for withdrawal (41 acres) • **Renewables:** Excluded for geothermal, solar, and avoid for wind • **VRM:** Class II (81 acres) • **Travel:** OHV limited • **Grazing:** Open • **ROWs:** 41 acres would be avoided, 41 acres would be open	Unit 801 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal and excluded from solar and wind • Travel: Closed Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Open • **ROWs**: Exclude	Unit 801 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal and excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I (41 acres), Class II (40 acres) • **Grazing**: Open • **ROWs**: Exclude	Unit 801 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal and excluded from solar and wind • **Travel:** Closed Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Open • **ROWs**: Exclude	Unit 801 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal and excluded from solar and wind • **Travel:** Closed Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Open • **ROWs**: Exclude
Unit 803A would not be managed as LWCs. It would be managed with the following prescriptions: **Unit 803A (1,139 acres):** • **Leasables:** Closed • **Salables:** Closed • **Locatables:** Recommended for withdrawal • **Renewables:** Excluded from solar, avoided for wind • **VRM:** Class II • **Travel:** OHV Limited • **Grazing:** Open • **ROWs:** Avoid	Unit 803A would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open • **ROWs**: Exclude	Unit 803A would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables:** Closed • **Locatables:** Recommended for withdrawal • **Renewables:** Excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open except for Unit 810, which would have 13,078 acres out of 18,381 acres closed to grazing, and Unit 810 B, which would have 5,947 acres out of 6,728 acres closed due to other resource concerns (Guadalupe Escarpment Habitat Management Area [HMA]) • **ROWs**: Exclude	Unit 803A would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open • **ROWs**: Exclude	Unit 803A would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal and excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open except for Unit 810, which would have 13,078 acres out of 18,381 acres closed to grazing, and Unit 810 B, which would have 5,947 acres out of 6,728 acres closed due to other resource concerns (Guadalupe Escarpment Habitat Management Area [HMA]) • **ROWs**: Exclude

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Unit 810 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open with standard terms (5,303 acres), open with moderate constraints (11,355 acres) • **Salables:** Open (16,657 acres), closed (1,724 acres) • **Locatables:** Open • **Renewables:** Variance for solar (3,873 acres) excluded for solar (14,509 acres) and open for wind (2,399 acres), avoid for wind (15,997 acres) • **VRM:** Class III (15,897 acres), Class IV (2,484 acres) • **Travel:** OHV limited • **Grazing:** Open • **ROWs**: Avoid (1,724 acres), open (16,655 acres)	Unit 810 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open (5,301 acres), closed (13,078 acres) • **ROWs**: Exclude	Unit 810 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: Same as Alternative A.	Unit 810 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • **Leasables**: Open (5,301 acres), open with moderate constraints (13,078 acres) • **Salables**: Open (5,301 acres), open with special terms and conditions (13,078 acres) • **Locatables**: Open • **Renewables**: Excluded from solar (13,708 acres), variance for solar (5,301 acres), excluded from wind (13,709 acres), open to wind (5,301 acres) • **VRM**: Class III (15,970 acres), Class IV (2,410 acres) • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **Grazing**: Open • **ROWs**: Open (5,301 acres), avoid (13,078 acres)	Unit 810 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Variance for solar, avoid for wind (13,080 acres), open for wind (5,301 acres) • **VRM**: Class III (15,970 acres), Class IV (2,410 acres) • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Open • **Grazing**: Open

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Unit 810B would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open with standard terms (783 acres), open with moderate constraints (5,948 acres) • **Salables:** Open • **Locatables:** Open • **Renewables:** Variance for solar (1,075 acres) excluded for solar (5,655 acres) and avoid for wind • **VRM:** Class III (4,649 acres), Class IV (2,081 acres) • **Travel:** OHV limited • **Grazing:** Open • **ROWs:** Open	Unit 810B would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open (780 acres), closed (5,947 acres) • **ROWs**: Exclude	Unit 810B would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open (780 acres), closed (5,947 acres) • **ROWs**: Exclude	Unit 810 B would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open (780 acres), Open with moderate constraints (5,948 acres) • **Salables**: Open (780 acres), open with special terms and conditions (5,948 acres) • **Locatables**: Open • **Renewables**: Excluded from solar (5,947 acres), variance for solar (780 acres), excluded from wind (5,948 acres), open to wind (780 acres) • **VRM**: Class III (5,832 acres), Class IV (897 acres) • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Open (780 acres), avoid (5,947 acres) • **Grazing:** Open	Unit 810 B would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Open to wind (780 acres), avoid for wind (5,948 acres), variance for solar • **VRM**: Class III (5,832 acres), Class IV (897 acres) • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Open • **Grazing**: Open
Unit 815 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open with standard terms (1,032 acres) and open with major constraints (2,957 acres) • **Salables:** Open with standard terms and conditions (1,032 acres), closed (2,956 acres) • **Locatables:** Open • **Renewables:** Excluded for solar; avoid for wind • **VRM:** Class II (2,956 acres), Class III (1,032 acres) • **Travel:** Open • **ROWs:** Open	Unit 815 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open • **ROWs**: Exclude	Unit 815 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open • **ROWs**: Exclude	Unit 815 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: Same as Alternative B except open with major constraints for leasables.	Unit 815 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Open • **Renewables**: Excluded from solar, and avoidance for wind • **VRM**: Class III • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Avoid • **Grazing**: Open

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Unit 902 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open with standard terms and conditions • **Salables:** Open • **Locatables:** Open • **Renewables:** Excluded for solar development; avoidance area for wind (9,456 acres), open to wind (377 acres) • **VRM:** Class IV • **Travel:** OHV limited • **ROWs:** Open	Unit 902 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal and excluded from solar and wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open except for Unit 810, which would have 13,078 acres out of 18,381 acres closed to grazing, and Unit 810 B, which would have 5,947 acres out of 6,728 acres closed due to other resource concerns (Guadalupe Escarpment Habitat Management Area [HMA]) • **ROWs**: Exclude	Unit 902 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: The unit would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Open • **Renewables**: Closed to geothermal and excluded from solar and wind • **VRM**: Class II • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Excluded • **Grazing**: Open	Unit 902 would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded from solar and wind • **VRM**: Class III • **Travel**: OHV limited until a travel plan is completed. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Avoidance • **Grazing**: Open	Unit 902 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded from solar and avoidance for wind • **VRM**: Class III • **Travel:** OHV limited until a travel plan is completed. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Open • **Grazing**: Open
Unit 909 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open with standard terms and conditions • **Salables:** Open • **Locatables:** Open • **Renewables:** Excluded for solar 6,697 acres); variance for solar (2,433 acres); open for wind (8,946 acres) and excluded (184 acres) • **VRM:** Class IV • **Travel:** OHV limited • **ROWs:** Open	Unit 909 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open • **ROWs**: Exclude	Unit 909 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • **Leasables**: Closed • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded from solar and wind • **VRM**: Class I • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Excluded • **Grazing**: Open	Unit 909 would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded from solar and wind • **VRM**: Class III • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Avoid • **Grazing**: Open	Unit 909 would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded from solar and avoidance for wind • **VRM**: Class III (792 acres), Class IV (8,337 acres) • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: **Avoid** • **Grazing: Open**

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Unit 922 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open (1,386 acres) and open with major constraints (4,364 acres) • **Salables:** Open (1,386 acres), closed (4,364 acres) • **Locatables:** Open • **Renewables:** Excluded from geothermal and solar, avoidance area for wind • **VRM:** Class II (4,364 acres), Class III (1,386 acres) • **Travel:** OHV limited • **ROWs:** Open	Unit 922 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class II • **Grazing**: Open • **ROWs**: Exclude	Unit 922 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: Same as Alternative B.	Unit 922 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • **Leasables**: Open with moderate constraints (1,385 acres), Open with major constraints (4,365 acres) • **Salables**: Open with special terms and conditions (1,385 acres), Closed (4,365 acres) • **Locatables**: Open • **Renewables**: Excluded from solar, avoidance for wind (1,385 acres), excluded from wind (4,366 acres) • **VRM**: Class II **(**4,364 acres), Class III (1,386 acres) • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Avoid (1,385 acres), Exclude (4,366 acres) • **Grazing**: Open	Unit 922 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics: • **Leasables**: Open with moderate constraints (1,385 acres, open with major constraints (4,365 acres) • **Salables**: Open with special terms and conditions (1,370 acres), closed (4,365 acres) • **Locatables**: Open • **Renewables**: Closed to geothermal, excluded from solar and avoidance for wind • **VRM**: Class III • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs**: Avoidance • **Grazing**: Open
Unit 813 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open • **Salables:** Open with special terms and conditions • **Locatables:** Open (8,504 acres) • **Renewables:** Excluded from solar and wind • **VRM:** Class III (2,632 acres), Class IV (5,868 acres) • **Travel:** OHV limited • **ROWs:** Open	Unit 813 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Closed • **ROWs**: Exclude	Unit 813 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables:** Excluded from solar and wind • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Open • **ROWs**: Exclude	Unit 813 would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded from solar and avoided for wind • **VRM**: Class III • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs:** Avoidance • **Grazing:** Open	Unit 813 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded from solar and avoided for wind • **VRM**: Class III (2,632 acres), Class IV (5,868 acres) • **Travel**: OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs:** Open • **Grazing:** Open

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Unit 810A would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables:** Open with standard terms • **Salables:** Open with standard terms • **Locatables:** Open • **Renewables:** Excluded for solar (990 acres) and variance for solar (17 acres); open for wind (190 acres) and avoid (817 acres). • VRM: Class III • Travel: OHV limited • **Grazing:** Open • **ROWs:** Open	Unit 810A would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables:** Closed • **Salables:** Closed • **Locatables:** Recommended for withdrawal • **Renewables:** Excluded for wind and variance for solar • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Closed • **ROWs**: Exclude	Unit 810A would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables:** Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from wind and variance for solar • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Open **ROWs**: Exclude	Unit 810A would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded from wind and variance for solar • **VRM**: Class III • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs:** Avoid • **Grazing:** Open	Unit 810A would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics and would be managed with the following prescriptions: • **Leasables:** Open • **Salables:** Open • **Locatables:** Open • **Renewables**: Excluded from wind and variance for solar • **VRM**: Class III • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **ROWs:** Open • **Grazing:** Open
Unit 125 would not be managed as LWCs. It would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded from solar and avoided for wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class IV • **Grazing**: Open • **ROWs**: Open	Unit 125 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar and excluded for wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class I • **Grazing**: Open • **ROWs**: Exclude	Unit 125 would be managed to protect its wilderness characteristics as a priority over multiple uses and would be managed with the following prescriptions: Same as Alternative A.	Unit 125 would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Variance for solar and exclude for wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **VRM:** Class III • **Grazing:** Open • **ROWs:** Avoid	Unit 125 would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics and would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **Renewables**: Variance for solar and exclude to wind • **Travel:** OHV limited. Maintenance that would alter the classification as a "primitive route" would not be permitted. Existing, natural route characteristics would be preserved, and maintenance would only be permitted in specific affected route segments where natural or other occurrences have rendered the route impassable. Maintenance would be limited to the affected area, and disturbance would be limited to the minimum required to restore passage. • **VRM**: Class III • **Grazing**: Open • **ROWs**: Open

Note: Some LWC management prescriptions contained in Table 2-7 are due to other overlapping resources values.

2.15 VISUAL RESOURCE MANAGEMENT

2.15.1 Goals

1. Maintain and/or enhance scenic values and visual qualities of public lands.

2.15.2 Objectives

1. Identify and apply BMPs to reduce the visual and related resource impacts on public lands during the exploration, development, and production of fluid minerals resources.
2. Identify and apply BMPs to reduce the visual and related resource impacts on public lands during the exploration, extraction, and processing of solid minerals.
3. Promote reclamation of landscapes, restoration of native habitats, and rehabilitation of waterways and riparian areas to enhance natural/historical scenic values that have been negatively altered.
4. Prepare and maintain on a continuing basis an inventory of visual values on all public lands.
5. Manage public lands in a manner that would protect the quality of the scenic (visual) values of these lands for present and future generations.

2.15.3 Management Common to All Alternatives

In areas of high scenic quality (Visual Inventory Scenic Quality Areas A and B), special considerations to protect the scenic quality should be given when planning the routing of utilities and access.

Note: Many Best Management Practices (BMPs) focus on reducing the visual or physical "footprint" of development. The theory is, the less vegetation that is disturbed, the less visible the disturbance would be. The choice of color is perhaps the most common and simplest BMP for reducing visual contrast. By selecting colors that help oil and gas equipment blend into the background, we lessen the visual intrusion on the landscape. For other proposed BMPs for Visual Resources see Appendix O.

Table 2-8. Alternatives for Visual Resource Management

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The following areas would be managed as VRM Class I (Map 2-7): • Devil's Den Canyon WSA • Lonesome Ridge WSA • McKittrick Canyon WSA Mudgetts WSA • The Lonesome Ridge ACEC (overlaps with the Lonesome Ridge WSA) Note: Not all WSA acreage was allocated as VRM Class I in the 1988 RMP. Current Bureau direction is that "all WSAs should be managed according to VRM Class I management objectives until such time as Congress decides to designate the area as wilderness or release it for other uses" (BLM Manual 6330, p. 1-35, 36) Total: 7,058 acres	The following areas would be managed as VRM Class I (Map 2-8): • Devil's Den Canyon WSA • Lonesome Ridge WSA • McKittrick Canyon WSA • Mudgetts WSA • Lonesome Ridge ACEC (the portion outside the WSA) • Cave Resources ACEC Manhole/Mudgetts units • LWC Unit 801 • LWC Unit 810A • LWC Unit 902 • LWC Unit 813 • LWC Unit 125 • LWC Unit 909 Total: 37,764 acres	Same as Alternative A, but also includes the following areas (Map 2-9): • Serpentine Bends ACEC • LWC Unit 803A Total: 42,102 acres	Same as Alternative A except no LWC units would be managed as VRM I (Map 2-10). Total: 7,171 acres	Same as Alternative C.
A total of 43,613 acres would be managed according to VRM Class II objectives. The following areas would be managed as VRM Class II see (Map 2-7): • Zone 1 of Guadalupe Escarpment • Cave management units • Pecos River Corridor Special Recreation Management Area (SRMA) • Dark Canyon Scenic Area/ACEC) • Pecos River Canyons Complex ACEC • Seven Rivers Hills Area • Additional dispersed acres • Black River Management Area • Conoco Lake	The following areas (235,946 acres) would be managed as VRM Class II (Map 2-8): • Serpentine Bends ACEC • Seven Rivers Hills ACEC • Portions of Cave Resources ACEC • Guadalupe Escarpment Scenic Area Zone 1 • Black River SRMA • Rio Peñasco/Picacho • Guadalupe Escarpment North • Pierce Cedar Canyon • Delaware River Corridor • Dark Canyon Road Loop (1.0-mile buffer on either side of the road) • Pecos River Corridor SRMA • Guadalupe Backcountry Byway • All lands managed to protect wilderness characteristics • Black River – Proposed as Suitable under the Wild and Scenic River Act • Delaware River – Proposed as Suitable under the Wild and Scenic River Act • Conoco Lake SRMA • Pecos River Canyon Complex ACEC Pecos Bluntnose Shiner Habitat ACEC Seven Rivers Hills (not an ACEC under this alternative)	The following areas (315,700 acres) would be managed as VRM Class II (Map 2-9): • Seven Rivers Hills ACEC • Guadalupe Escarpment Scenic Area Zone 1 • Black River SRMA • Rio Peñasco/Picacho • Guadalupe Escarpment North • Pierce Cedar Canyon • Delaware River Corridor • Portions of the Cave Resources ACEC • Maroon Cliffs ACEC • Livingston Ridge • Pecos River Corridor SRMA • West Forest Service • Guadalupe Escarpment S • Hay Hollow A • Dark Canyon Road Loop (1.0-mile buffer on either side of the road) • Guadalupe Backcountry Byway • All lands managed to protect wilderness characteristics • Black River Wild and Scenic River (WSR) • Conoco Lake SRMA • Pecos River Equestrian Trail Extensive Recreation Management Area (ERMA) • Pecos River Canyon Complex ACEC • Pecos Bluntnose Shiner Habitat ACEC • Seven Rivers Hills ACEC • Six Shooter ACEC	The following areas (60,791 acres) would be managed as VRM Class II (Map 2-10): • Serpentine Bends ACEC • Seven Rivers Hills ACEC • Guadalupe Escarpment Scenic Area Zone 1 • Black River SRMA • Portions of the Cave Resources ACEC • Delaware River Corridor • Pecos River Corridor SRMA • All lands managed to protect wilderness characteristics • Black River WSR • Conoco Lake SRMA • Pecos River Equestrian Trail ERMA • Pecos Bluntnose Shiner Habitat ACEC • Seven Rivers Hills ACEC • Six Shooter (not an ACEC under this alternative)	The following areas (41,092 acres) would be managed as VRM Class II (Map 2-11): • Serpentine Bends ACEC • Delaware River Corridor • Pecos River Corridor SRMA • All lands managed to protect wilderness characteristics units • Black River WSR • Black River SRMA • Conoco Lake SRMA • Pecos River Equestrian Trail ERMA • Pecos Bluntnose Shiner Habitat ACEC • Six Shooter (not an ACEC under this alternative)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
A total of 402,725 acres would be managed according to Class III VRM objectives. This includes 48,170 acres within seven Special Management Areas (SMAs), and an additional 227,990 acres outside SMAs. Zone 2 (40,750 acres) of the Guadalupe Escarpment Scenic Area would be managed with VRM Class III objectives to protect visual quality and sensitivity. SMAs were designations used in the 1988 RMP and included ACECs, Research Natural Areas (RNAs), Outstanding Natural Areas, etc. This designation would no longer be used and therefore would not appear in the action alternatives (Alternatives A–D). Please see Section 3.4.4, Special Management Areas for more information.	Approximately 367,205 acres would be managed as VRM Class III (Map 2-8) including the following areas: • Portions of the Cave Resources ACEC • Maroon Cliffs/Livingston Ridge • West Forest Service • Pavo Mesa • Square Lake South ERMA • Dark Canyon Road to Park (outside of Dark Canyon Road) (1.0-mile buffer on either side of the road) • La Cueva SRMA • Hay Hollow • Guadalupe Escarpment South • Alkali Lake SRMA • West Wells Dunes (Not an ERMA under this alternative) • Hackberry Lake SRMA • Laguna Plata ACEC	Approximately 294,177 acres would be managed as VRM Class III (Map 2-9) including the following areas: • Portions of the Cave Resources ACEC • Pavo Mesa • Square Lake South ERMA • Dark Canyon Road to Park (outside Dark Canyon Road) (1.0-mile buffer on either side of the road) • Alkali Lake SRMA Backcountry Byway (2.5-mile buffer) • Hay Hollow B • La Cueva SRMA • West Well Dunes ERMA • Hay Hollow Equestrian ERMA • Hackberry Lake SRMA • Laguna Plata ACEC	Approximately 549,329 acres would be managed as VRM Class III (Map 2-10) including the following areas: • Rio Peñasco/Picacho • Guadalupe Escarpment North • Pierce Cedar Canyon • Portions of the Cave Resources ACEC • Maroon Cliffs/Livingston Ridge • West Forest Service • La Cueva SRMA • Pavo Mesa • Square Lake South ERMA • Dark Canyon Road Loop (0.25-mile buffer on each side of the road) and Dark Canyon Road to Park (outside Dark Canyon Road) • Hay Hollow • Pecos River Equestrian ERMA • 62/180 Corridor • Alkali Lake ERMA • West Well Dunes ERMA • Hackberry Lake SRMA • Pecos River Canyon Complex ACEC • Laguna Plata (Not proposed as an ACEC under this alternative) • Guadalupe Backcountry Byway	Approximately 546,205 acres would be managed as VRM Class III (Map 2-11) including the following areas: • Rio Peñasco/Picacho • Seven Rivers Hills ACEC • Guadalupe Escarpment Scenic Area Zone 1 • Guadalupe Escarpment North • Pierce Cedar Canyon • Portions of the Cave Resources ACEC • Maroon Cliffs/Livingston Ridge • West Forest Service • Pavo Mesa • Dark Canyon Road to Park (outside Dark Canyon Road) • Dark Canyon Road Loop (1.0-mile buffer on each side of the road) • U.S. Highway 62/180 Corridor • Hay Hollow • La Cueva SRMA • West Well Dunes ERMA • Hackberry Lake SRMA • Pecos River Canyon Complex ACEC • Laguna Plata (Not an ACEC under this alternative) • Seven Rivers Hills ACEC • Guadalupe Backcountry Byway
All remaining areas not designated as VRM Class I, II, and III are managed as VRM Class IV (2,330,462 acres) (Map 2-7).	All split estate and any BLM-administered surface that is not designated as VRM Class I, II, and III would be managed as VRM Class IV (2,142,600 acres) (Map 2-8).	All split estate and any BLM-administered surface not designated as VRM Class I, II, and III would be managed as VRM Class IV (2,131,501 acres) (Map 2-9).	All split estate and any BLM-administered surface not designated as VRM Class I, II, and III would be managed as VRM Class IV (2,166,266 acres) (Map 2-10).	All split estate and any BLM-administered surface not designated as VRM Class I, II, and III would be managed as VRM Class IV (2,189,116 acres) (Map 2-11).

2.16 AIR RESOURCES (INCLUDING AIR QUALITY AND CLIMATE)

2.16.1 Goals

1. Manage activities and development within the planning area considering air and atmospheric values.
2. Manage CFO activities and authorized uses to maintain and improve the quality of the planning area's air resources.
3. Manage CFO activities and authorized uses to avoid or minimize emissions of greenhouse gases.

2.16.2 Objectives

1. Manage CFO activities and development to comply with all applicable local, state, tribal, and federal laws, regulations, standards, and implementation plans.
2. Manage CFO activities and development to protect and improve air quality and, within the scope of the BLM's authority, minimize emissions that cause or contribute to violations of air quality standards or that negatively impact AQRVs (e.g., acid deposition, visibility).
3. Manage CFO activities and development to avoid or minimize emissions of greenhouse gases.
4. Manage hydrogen sulfide (H_2S) emissions to protect public health and safety and wildlife.
5. Minimize light pollution to protect the dark skies of Carlsbad Caverns and Guadalupe Mountains National Parks.
6. Maintain attainment status for all National Ambient Air Quality Standards (NAAQS) and New Mexico Environment Department (NMED) standards.

2.16.3 Management Common to All Alternatives

1. Under all alternatives, oil and gas production facilities must comply with applicable federal and state regulatory requirements for the protection of ambient air quality, including the applicable regulatory requirements of the EPA and the State of New Mexico. -Management Common to All Action Alternatives (actions that apply to Alternatives A, B, C, and D only)

2. Within 1 year of the Record of Decision (ROD), all new and existing drill rig, completion rig, work-over rig, and frac pump engines would meet EPA Tier 4 Nonroad Diesel Engine Emission Standards or equivalent emission standards, regardless of when they begin operation in the planning area. During drilling activities, socks should be placed on vent lines when transferring cement from bulk trucks to silos and when blowing down silos into bulk trucks.

Table 2-9. Alternatives for Air Resources (Including Air Quality and Climate)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Stipulations would be incorporated into project proposals to meet air quality standards.	Vapor recovery units would be required to reduce greenhouse gases, volatile organic compounds (VOCs), and hazardous air pollutants on all new wells and production facilities.	Same as Alternative A.	Vapor recovery units would be required on a case-by-case basis as determined by the BLM.	Vapor recovery units would not be required.
	Use URS Alternative B modeling scenario (reasonably foreseeable development [RFD] plus extra management), as noted below.	Use URS Alternative B modeling scenario (RFD plus extra management), as noted below.	Use URS Alternative A modeling scenario, as noted below.	Use URS Alternative A modeling scenario, as noted below
Stipulations would be incorporated into project proposals to meet air quality standards.	Green completions (including re-completions and blow-down activities) involving recovery and cleanup of natural gas would be required for all natural gas and oil wells unless the need for an exemption could be documented.	Same as Alternative A.	Operators must comply with all applicable EPA NSPS regulations, including those limiting emissions during well completions. Operators must also comply with all applicable BLM regulations pertaining to the venting and flaring of gas.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	During construction activities (including well drilling, completion, and work-over), twice daily watering of construction areas and associated resource roads would be required to prevent at least 50% of fugitive dust from vehicular traffic, equipment operations, or wind events. The Authorized Officer may direct the operator to change the level and type of treatment if dust abatement measures are observed to be insufficient to prevent fugitive dust. In addition, fugitive dust control plans would be required.	Same as Alternative A.	No similar action.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	Emission controls would be required for oil tanks, condensate tanks, and produced water tanks, without regard to the quantity of uncontrolled VOC emissions from the equipment. VOC emissions from oil tanks, condensate tanks, and produced water tanks would be reduced by at least 95% from uncontrolled emission levels.	Same as Alternative A.	Oil tanks, condensate tanks, and produced water tanks would be required to meet applicable EPA NSPS emission standards such that new storage tanks with VOC emissions of 6 tons per year or more must reduce VOC emissions by at least 95%.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	In addition to EPA National Emission Standards for Hazardous Air Pollutants for Oil and Natural Gas Production applicable to glycol dehydrators, emission controls would be required for glycol dehydrators without regard to the location of the equipment or the quantity of uncontrolled VOC emissions from the equipment. This would apply to new tanks only. VOC emissions from glycol dehydrators would be reduced by at least 95% from uncontrolled emission levels.	Same as Alternative A.	Glycol dehydrators located at well sites, gathering and boosting stations, gas processing plants, and natural gas transmission stations would be required to meet applicable EPA National Emission Standards for Hazardous Air Pollutants for Oil and Natural Gas Production.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	The CFO would cooperate with the NMED in identifying air monitoring needs, as well as air monitor installation and operation.	Same as Alternative A.	No similar action.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	At least 70% of gas compression at compressor stations (gathering, boosting, transmission, and gas plants) and well heads would be powered by electricity. Any new electricity transmission lines would be buried underground in existing ROWs.	Same as Alternative A.	No similar action.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	At least 70% of CFO oil well head pumps would be powered by electricity. Any new electricity transmission lines would be buried underground in existing ROWs.	Same as Alternative A.	No similar action.	Same as Alternative C.
Stipulations would be incorporated into project proposals to meet air quality standards.	Pneumatic controllers at gas gathering and boosting stations, well sites, and gas processing plants would be required to meet EPA NSPS requirements. This would be required unless the need for exemption can be documented.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Stipulations would be incorporated into project proposals to meet air quality standards.	New and modified centrifugal or reciprocating compressors at gas gathering and boosting stations, well sites, and gas processing plants would be required to meet EPA NSPS and NMED requirements and standards.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Stipulations would be incorporated into project proposals to meet air quality standards.	New and modified natural gas sweetening units at gas processing plants would be required to meet EPA requirements.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

2.17 MINERALS – LEASABLES – OIL AND GAS

2.17.1 Goals

The geology and natural resources in the planning area significantly contribute to domestic energy production, provides alternatives to overseas energy resources, creates jobs, and enhances the Nation's energy security and economy.

1. Promote and support American agriculture and provide jobs and economic development opportunities to the local community. (Executive Order 13790, April 25, 2017).
2. Support the national interest to promote clean and safe development of our Nation's vast energy resources, in a manner that does not unnecessarily encumber energy production, constrain economic growth, and prevent job creation. (Executive Order 13783 March 28, 2017).

2.17.2 Objectives

1. Allow the oil and gas industries reasonable opportunities to lease and explore, while protecting sensitive areas and various other resources.
2. The BLM would seek the input of industry and the public at every opportunity to discuss changes in policy or priorities.
3. Facilitate reasonable, economical, and environmentally sound exploration and development of leasable minerals where compatible with resource objectives and as consistent with Secretarial Order 3324.

2.17.3 Management Common to All Alternatives

1. The BLM would manage and facilitate the development by private industry of public land mineral resources so that national and local needs are met, and environmentally sound exploration, extraction, and reclamation practices are used.
2. The BLM would monitor leasable mineral operations to ensure proper resource recovery and evaluation, production verification, and diligence in inspection and enforcement of the lease, sale, or permit terms.

For fluid leasable mineral resources, the land use plan must identify lands in four land use categories: open to leasing with standard terms and conditions; open to leasing with minor and moderate constraints; open to leasing with highly restrictive, major constraints; and closed to leasing. The definitions are as follows:

- **Open with Standard Terms and Conditions:** This category identifies lands that are open to exploration and development subject to standard lease stipulations on a standard lease form.
- **Open with Minor or Moderate Constraints:** This category identifies lands that are open to leasing with relatively minor and moderate constraints such as seasonal restrictions. These areas possess other land uses or resource values such as critical special status plant and wildlife species habitat that might conflict with fluid leasable exploration and development, and, therefore, moderately restrictive lease stipulations may be required to mitigate these impacts. The stipulations are used where resource values require some sort of special protection, but the conflicts with fluid leasable exploration and development are not of sufficient magnitude to preclude surface occupancy.
- **Open with Major Constraints:** This mineral lease category identifies areas that are open to exploration and development but subject to highly restrictive lease stipulations, which includes NSO. These areas possess special resource values or land uses such as camping or picnic areas, scenic areas, Recreation and Public Purpose (R&PP) patents and leases, important historical or archaeological areas, and buffer zones along the boundaries of special use areas such as WSR corridors. This category is used for those areas where a number of seasonal or other minor constraints would severely restrict exploration and development.
- **Closed to Leasing:** This lease category identifies areas that are closed to leasing either by discretionary or non-discretionary decisions. These areas have other land uses or resource values that cannot be adequately protected even with the most restrictive lease stipulations. Closing these areas to leasing is the only way to ensure their appropriate protection. Discretionary closures involve lands where the BLM has determined that energy or mineral leasing, entry, or disposal, even with the most restrictive stipulations or conditions, would not be in the public interest. Discretionary closures involve lands that are specifically closed to energy or mineral leasing, entry, or disposal by law, regulations, Secretarial decision, or Executive Order.

Table 2-10. Alternatives for Fluid Mineral Leasing

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
For BLM-administered lands within the planning area, leasable minerals would be managed under the following categories (Map 2-13): • Open with standard lease terms and conditions (1,598,870 acres) • Open with moderate constraints (CSU) (956,410 acres)	For BLM-administered lands within the planning area, leasable minerals would be managed under the following categories (Map 2-14,): • Open with standard lease terms and conditions (1,142,802 acres) • Open with moderate constraints (CSU) (799,649 acres)	For BLM-administered lands within the planning area, leasable minerals would be managed under the following categories (see Maps 2.15,): • Open with standard lease terms and conditions (1,089,481 acres) • Open with moderate constraints (CSU) (449,759 acres)	For BLM-administered lands within the planning area, leasable minerals on would be managed under the following categories (Map 2-16): • Open with standard lease terms and conditions (1,750,774 acres) • Open with moderate constraints (CSU) (786,381) • Open with major constraints (NSO) (158,401 acres)	For BLM-administered lands within the planning area, leasable minerals would be managed under the following leasing categories (see Maps 2.17): • Open with standard lease terms and conditions (1,997,681 acres) • Open with moderate constraints (CSU) (631,634 acres) • Open with major constraints (NSO) (70,142 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
• Open with major constraints (NSO) (54,602 acres) • Closed (174,391 acres) **Total**: 2,784,273 acres Lease stipulations associated with the leasing categories can be found in Appendix C – Fluid Minerals Lease Stipulations. Conditions of Approval and BMPs can be found in Appendix O. Note: Differences in total acreages between alternatives can vary up to 250 acres due to the intersection of geographic information system (GIS) shapefiles that create "slivers" when two or more layers are intersected with the BLM ownership layer.	• Open with major constraints (NSO) (80,394 acres) • Closed (761,404 acres) **Total**: 2,784,248 acres Lease stipulations associated with the leasing categories can be found in Appendix C – Fluid Minerals Lease Stipulations. Conditions of Approval and BMPs can be found in Appendix O.	• Open with major constraints (NSO) (162,013 acres) • Closed (1,082,972 acres) **Total**: 2,784,224 acres Lease stipulations associated with the leasing categories can be found in Appendix C – Fluid Minerals Lease Stipulations. Conditions of Approval and BMPs can be found in Appendix O.	• Closed (88,502 acres) **Total**: 2,784,058 acres Lease stipulations associated with the leasing categories can be found in Appendix C – Fluid Minerals Lease Stipulations. Conditions of Approval and BMPs can be found in Appendix O.	• Closed (84,687 acres) **Total**: 2,784,145 acres Lease stipulations associated with the leasing categories can be found in Appendix C – Fluid Minerals Lease Stipulations. Conditions of Approval and BMPs can be found in Appendix O.
There is no management specific to M-Polygons under the No Action Alternative. However, for analysis purposes the M-Polygons would be managed as follows (Map 2-12). **Open with standard terms:** M-2 Eastern Guadalupe Escarpment (19 acres); M-3 Guadalupes (45,324 acres); M-4 Guadalupe Escarpment Zone 1 (10,285 acres); M-5 Guadalupe Escarpment Zone 2 (17,567 acres); M-6 Washington Ranch Road-Scenic Corridor (5,052 acres); M-7 Highway 62/180 – Scenic Corridor (11,147 acres); M-8 Wildlife Migration/Emigration (10,454 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,034); M-12 Large Delaware Buffer (2,476 acres); M-13 Hope Area Grasslands (1,027 acres); M-14 Chaves Bootheel (244,915 acres); M-15 Community Needs Buffer – Living Desert (1,024 acres); M-16 Community Needs Buffer – Schools (768 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (53,123 acres); M-19 Habitat Area (600 acres); M-20 Heronry Buffers (4,655 acres). **Open with moderate constraints:** M-2 Eastern Guadalupe Escarpment (23,793 acres); M-13 Hope Area Grasslands (104,744 acres); M-14 Chaves Bootheel (35,902 acres); M-18 Sensitive Soils (1,861 acres); M-19 Habitat Area (81 acres); M-20 Heronry Buffers (5,929 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,630 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,399 acres); M-24 City of Carlsbad Caprock Water Supply Field (482 acres). **Open with major constraints:** M-2 Eastern Guadalupe Escarpment (1,724 acres); M-3 Guadalupes (12,117 acres); M-4 Guadalupe Escarpment Zone 1 (12,902 acres); M-6 Washington Ranch Road-Scenic Corridor (48 acres); M-7 Highway 62/180 – Scenic Corridor (213 acres); M-11 Small Delaware Buffer (157 acres) M-12 Large Delaware	The M-Polygons listed below are areas where special mineral management prescriptions would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open with standard terms:** M-3 Guadalupes (13,685 acres); M-5 Guadalupe Escarpment Zone 2 (2 acres); M-6 Washington Ranch Road – Scenic Corridor (128 acres); M-7 Highway 62/180 – Scenic Corridor (5,710 acres); M-12 Large Delaware Buffer (4 acres); M-13 Hope Area Grasslands (10 acres); M-14 Chaves Bootheel (2 acres); M-16 Community Needs Buffer – Schools (619 acres); M-20 Heronry Buffers (11 acres); M-21 Gnome Site Withdrawal (7 acres). **Open with moderate constraints:** M-3 Guadalupes (33 acres); M-7 Highway 62/180 – Scenic Corridor (33 acres); M-13 Hope Area Grasslands (34 acres); M-14 Chaves Bootheel (31 acres); M-19 Habitat Areas (113 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40-acres); M-26 Airports (645 acres). **Open with major constraints:** M-3 Guadalupes (28,260 acres); M-4 Guadalupe Escarpment Zone 1 (14,398 acres); M-5 Guadalupe Escarpment Zone 2 (14,731 acres); M-6 Washington Ranch Road – Scenic Corridor (3,729 acres); M-7: Highway 62/180 – Scenic Corridor (2,706 acres); M-8 Wildlife Migration/Emigration (6,128 acres); M-11 Small Delaware Buffer (2 acres); M-12 Large Delaware Buffer (2 acres); M-16 Community Needs Buffer – Schools (149 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-20 Heronry Buffers (10,831 acres). **Closed:** M-1 Serpentine Bends (15,588 acres); M-2 Eastern Guadalupe Escarpment (25,529 acres); M-3 Guadalupes (17,064 acres); M-4 Guadalupe Escarpment Zone 1 (8,781 acres); M-5 Guadalupe Escarpment Zone 2 (2,832 acres); M-6 Washington	The M-Polygons listed below are areas where special mineral management prescriptions would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open with standard terms:** M-11 Small Delaware Buffer (4 acres); M-12 Large Delaware Buffer (5 acres); M-13 Hope Area Grasslands (10 acres); M-14 Chaves Bootheel (2 acres); M-16 Community Needs Buffer – Schools (1 acre); M-20 Heronry Buffers (11 acres); M-21 Gnome Site Withdrawal (6 acres). **Open with moderate constraints:** M-3 Guadalupes (7,859 acres); M-2 Guadalupe Escarpment Zone 2 (2 acres); M-21 Gnome Site Withdrawal (1 acre); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40-acres); M-26 Airports (645 acres). **Open with major constraints:** M-3 Guadalupes (22,740 acres); M-5 Guadalupe Escarpment Zone 2 (14,659 acres); M-6 Washington Ranch Road – Scenic Corridor (2,895 acres); M-7 Highway 62/180 – Scenic Corridor (8,183 acres); M-8 Wildlife Migration/Emigration (9,541 acres); M-11 Small Delaware Buffer (2,186 acres); M-12 Large Delaware Buffer (2,709 acres); M-16 Community Needs Buffer – Schools (765 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (55,941 acres); M-19 Habitat Area (2 acres); M-20 Heronry Buffers (10,931 acres). **Closed:** M-1 Serpentine Bends (15,588 acres); M-2 Eastern Guadalupe Escarpment (25,529 acres); M-3 Guadalupes (22,740 acres); M-4 Guadalupe Escarpment Zone 1 (23,186 acres); M-5 Guadalupe Escarpment Zone 2 (2,905 acres); M-6 Washington Ranch Road – Scenic Corridor (2,254 acres); M-7 Highway 62/180 – Scenic Corridor (4,783 acres); M-8 Wildlife Migration/Emigration (1,492 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River	The M-Polygons listed below are areas where special mineral management prescriptions would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open with standard terms:** M-1 Eastern Guadalupe Escarpment (1 acre); M-8 Wildlife Migration/Emigration Corridor (4,853 acres); M-11 Small Delaware Buffer (5 acres); M-12 Large Delaware Buffer (442 acres); M-13 Hope Area Grasslands (18,574 acres); M-14 Chaves Bootheel (248,451 acres); M-16 Community Needs Buffer – Schools (1 acre); M-18 Sensitive Soils (7 acres); M-19 Habitat Area (43 acres); M-20 Heronry Buffers (14 acres); M-21 Gnome Site Withdrawal (6 acres); M-25 Little Walt Canyon (40 acres). **Open with moderate constraints:** M-2 Eastern Guadalupe Escarpment (25,517 acres); M-3 Guadalupes (31,983 acres); M-4 Guadalupe Escarpment Zone 1 (1 acre); M-5 Guadalupe Escarpment Zone 2 (16,031 acres); M-6 Washington Ranch Rd. – Scenic Corridor (2,894 acres); M-7 Hwy 62/180 – Scenic Corridor (8,183 acres); M-8 Wildlife Migration/Emigration Corridor (3,395 acres); M-13 Hope Area Grasslands (89,626 acres); M-14 Chaves Bootheel (39,950 acres); M-18 Sensitive Soils (55,195 acres); M-19 Habitat Area (78 acres); M-20 Heronry Buffers (10,571 acres); M-21 Gnome Site Withdrawal (1 acre); M-22 City of Carlsbad Capitan Water Supply Field (14,242 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (5 acres); M-24 City of Carlsbad Caprock Water Supply Field (482 acres); M-26 Airports (845 acres). **Open with major constraints:** M-2 Eastern Guadalupe Escarpment (8 acres); M-3 Guadalupes (22,625 acres); M-4 Guadalupe Escarpment Zone 1 (23,180 acres); M-5 Guadalupe Escarpment Zone 2 (200 acres); M-6 Washington Ranch Road – Scenic Corridor (1,149 acres); M-7 Highway 62/180 – Scenic Corridor (1,807 acres); M-8 Wildlife Migration/Emigration (2,478 acres); M-9 Steep Slopes	The M-Polygons listed below are areas where special mineral management prescriptions would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open with standard terms:** M-2 Eastern Guadalupe Escarpment (25,526 acres); M-3 Guadalupes (16,419 acres); M-5 Guadalupe Escarpment Zone 2 (3 acres); M-6 Washington Ranch Road – Scenic Corridor (232 acres); M-7 Highway 62/180 – Scenic Corridor (7,612 acres); M-8 Wildlife Migration/Emigration (7,641 acres); M-10 Black River Management Area (476 acres); M-11 Small Delaware Buffer (9 acres); M-12 Large Delaware Buffer (446 acres); M-13 Hope Area Grasslands (18,587 acres); M-14 Chaves Bootheel (276,915 acres); M-18 Sensitive Soils (54,945 acres); M-19 Habitat Area (2 acres); M-20 Heronry Buffers (12 acres); M-21 Gnome Site Withdrawal (7 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40 acres). **Open with moderate constraints:** M-3 Guadalupes (16,153 acres); M-4 Guadalupe Escarpment Zone 1 (1 acre); M-5 Guadalupe Escarpment Zone 2 (16,140 acres); M-6 Washington Ranch Road – Scenic Corridor (2,804 acres); M-7 Highway 62/180 – Scenic Corridor (572 acres); M-8 Wildlife Migration/Emigration (689 acres); M-9 Steep Slopes and Kuenzler's Hedgehog Cactus (2,716 acres); M-10 Black River Management Area (111 acres); M-13 Hope Area Grasslands (89,638 acres); M-14 Chaves Bootheel (11,487 acres); M-16 Community Needs Buffer – Schools (618 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (259 acres); M-19 Habitat Area (86,903 acres); M-20 Heronry Buffers (10,570 acres); M-22 City of Carlsbad Capitan Water Supply Field (14,246 acres); M-23 City of Carlsbad Capitan Water Supply Proper (8 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-26 Airports (845 acres).

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Buffer (238 acres); M-18 Sensitive Soils (2,065 acres); M-19 Habitat Area (13,184 acres); M-20 Heronry Buffers (360 acres); M-26 Airports (845 acres) **Closed:** M-1 Serpentine Bends (15,588 acres); M-3 Guadalupes (1,607 acres); M-6 Washington Ranch Road-Scenic Corridor (51 acres); M-7 Highway 62/180 – Scenic Corridor (1,607 acres); M-8 Wildlife Migration/Emigration (578 acres); M-13 Hope Area Grassland (2,528 acres); M-14 Chaves Bootheel (7,609 acres); M-15 Community Needs Buffer – Living Desert (1,514 acres); M-18 Sensitive Soils (665 acres); M-19 Habitat Area (73,831 acres); M-21 Gnome Site (650 acres); M-22 City of Carlsbad Capitan Water Supply Field (274 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (265 acres); M-25 Little Walt Canyon (40 acres); M-27 State Militia (679 acres).	Ranch Road – Scenic Corridor (1,292 acres); M-7 Highway 62/180 – Scenic Corridor (4,517 acres); M-8: Wildlife Migration/Emigration (4,899 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,185 acres); M-12 Large Delaware Buffer (2,708 acres); M-13 Hope Area Grasslands (108,233 acres); M-14 Chaves Bootheel (288,383 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-18 Sensitive Soils (57,715 acres); M-19 Habitat Area (87,600 acres); M-20 Heronry Buffers (100 acres); M-21 Gnome Site (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,905 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,664 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-26 Airports (200 acres); M-27 State Militia (679 acres).	Management Area (650 acres); M-13 Hope Area Grasslands (108,269 acres); M-14 Chaves Bootheel (288,414 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-18 Sensitive Soils (1,767 acres); M-19 Habitat Area (87,710 acres); M-21 Gnome Site (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,905 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,664 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-26 Airports (200 acres); M-27 State Militia (679 acres).	(2,716 acres); M-10 Black River Management Area (587 acres); M-11 Small Delaware Buffer (2,183 acres); M-12 Large Delaware Buffer (2,269 acres); M-16 Community Needs Buffer – Schools (766 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (1,417 acres); M-19 Habitat Area (87,603 acres) (NSO); M-20 Heronry Buffers (360 acres); M-22 City of Carlsbad Capitan Water Supply Field (7,512 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,510 acres). **Closed:** M-1 Serpentine Bends(15,588 acres); M-3 Guadalupes (4,435 acres); M-5 Guadalupe Escarpment Zone 2 (1,334 acres); M-6 Washington Ranch Road – Scenic Corridor (1,105 acres); M-7 Highway 62/180 – Scenic Corridor (2,976 acres); M-8 Wildlife Migration/Emigration (308 acres); M-10 Black River Management Area (64 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-18 Sensitive Soils (1,095 acres); M-21 Gnome Site (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (138 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (138 acres); M-27 State Militia (679 acres).	**Open with major constraints:** M-3 Guadalupes (24,852 acres); M-4 Guadalupe Escarpment Zone 1 (23,180 acres); M-5 Guadalupe Escarpment Zone 2 (1,424 acres); M-6 Washington Ranch Road – Scenic Corridor (2,063 acres); M-7 Hwy 62/180 – Scenic Corridor (3,161 acres); M-8 Wildlife Migration/Emigration Corridor (2,704 acres); M-10 Black River Management Area (64 acres); M-11 Small Delaware Buffer;; M-12 Large Delaware Buffer (2,269 acres); M-16 Community Needs Buffer – Schools (148 acres); M-18 Sensitive Soils (1,846 acres); M-19 Habitat Area (808 acres); M-20 Heronry Buffers (360 acres); M-22 City of Carlsbad Capitan Water Supply Field (7,512 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,510 acres). **Closed:** M-1 Serpentine Bends (15,588 acres); M-3 Guadalupes (1,622 acres); M-6 Washington Ranch Road – Scenic Corridor (51 acres); M-7 Highway 62/180 – Scenic Corridor (1,622 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-18 Sensitive Soils (665 acres); M-21: Gnome Site (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (138 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (138 acres); M-27 State Militia (679 acres).

2.18 MINERALS – NON-ENERGY SOLID LEASABLES

2.18.1 Goals

1. Provide opportunities for mineral leasing, exploration, and development while maintaining other resource values to the extent possible.

2.18.2 Objectives

1. Develop and maintain reserves model to assist in the mineral resources determination for mineral development allocation.
2. Choose the best drill island within a given development area to maximize opportunities for resource recovery of both potash and oil and gas.
3. Facilitate reasonable, economical, and environmentally sound exploration and development of leasable minerals where compatible with resource objectives.

2.18.3 Management Common to All Alternatives

1. All actions would comply with S.O. 3324 “Oil, Gas, and Potash Leasing and Development within the Designated Potash Area of Eddy and Lea Counties, New Mexico", including Section 6, General Provisions, Article 4, which states, “The drilling or the abandonment of any well on said lease shall be done in accordance with applicable oil and gas operating regulations (43 CFR 3160), including such requirements as the Authorized Officer may prescribe as necessary to prevent the infiltration of oil, gas, or water into formations containing potash deposits or into mines or workings being utilized in the extraction of such deposits.”
2. The BLM would manage and facilitate the development by private industry of public land mineral resources so that national and local needs are met, and environmentally sound exploration, extraction, and reclamation practices are used.
3. The BLM would monitor leasable mineral operations to ensure proper resource recovery and evaluation, production verification, and diligence in inspection and enforcement of the lease, sale, or permit terms.
4. BLM management of potash leasing is described in the Environmental Analysis Record on Potash Leasing in Southwest New Mexico and the East Eddy/Lea Management Framework Plan, which are incorporated into the Draft RMP/EIS by reference (BLM 1975).
5. The Secretary of the Interior issued an order in 2012 to provide guidelines for the leasing and development of oil and gas and potash resources that occur on the same lands. Secretarial Order 3324 (77 Federal Register 71814) establishes the rules for the orderly co-development of oil and gas and potash deposits owned by the United States within the designated Potash Area in eastern Eddy and western Lea Counties (Map 3-17 in Appendix B). The Secretarial Order reaffirms the established Designated Potash Area, encompassing approximately 497,002 acres.
6. Oil and gas project in potash areas outside of Designated Potash Area (DPA) would be subjected to the Ochoa Mine Project ROD (BLM 2014).
7. Non-Energy Solid Leasable Minerals would be managed under the same leasing categories and with the same stipulations as fluid leasables.
8. All cave locations are closed to solid leasables development.

Note: Implementation level decisions for non-energy solid leasables and other mineral resources can be found in Appendix L – Implementation Level Decisions.

2.19 MINERALS – LOCATABLES

2.19.1 Goals

1. Locatable mineral development would not cause unnecessary and undue degradation of resources.
2. Provide for locatable mineral development where compatible with other resources.

2.19.2 Objectives

1. Facilitate reasonable, economical, and environmentally sound exploration and development of locatable minerals.

2.19.3 Management Common to All Alternatives

1. The planning area would be available for location of mining claims unless withdrawn.
2. The BLM would manage and facilitate the development by private industry of public land mineral resources so that national and local needs are met, and environmentally sound exploration, extraction, and reclamation practices are used.
3. Existing withdrawals would continue.

Note: A concerted effort was made by the Interdisciplinary Team to identify and propose to open as many areas as possible to locatable minerals while also managing resources. Those areas that remain proposed as recommended for withdrawal to locatables were carefully examined to ensure the areas are as small as necessary in order to adequately manage resources of concern.

Table 2-11. Alternatives for Locatable Minerals

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
For BLM-administered lands within the planning area, locatable minerals would be managed under the following categories (Map 2-18): • Open to mineral entry (2,751,856 acres) • Recommended for withdrawal (32,374 acres) **Total**: 2,784,229 acres Note: Differences in total acreages between alternatives can vary up to 250 acres due to the intersection of GIS shapefiles that create "slivers" when two or more layers are intersected with the BLM ownership layer.	For BLM-administered lands within the planning area, locatable minerals would be managed under the following categories (Map 2-19): • Open to mineral entry (2,403,114 acres) • Recommended for withdrawal (380,990 acres) **Total**: 2,784,105 acres	For BLM-administered lands within the planning area, locatable minerals would be managed under the following categories (Map 2-20): • Open to mineral entry (2,110,098 acres) • Recommended for withdrawal (673,996 acres) **Total**: 2,784,094	For BLM-administered lands within the planning area, locatable minerals would be managed under the following categories (Map 2-21): • Open to mineral entry (2,651,855 acres) • Recommended for withdrawal (132,249 acres) **Total**: 2,784,104 acres	For BLM-administered lands within the planning area, locatable minerals would be managed under the following categories (Map 2-22): • Open to mineral entry (2,661,705 acres) • Recommended for withdrawal (122,444 acres) **Total**: 2,784,149
There is no management specific to M-Polygons under the No Action Alternative. However, for analysis purposes the M-Polygons are managed as follows (Map 2-12). **Open**: M-1 Serpentine Bends (10,095 acres); M-2 Eastern Guadalupe Escarpment (25,525 acres); M-3 Guadalupes (58,475 acres); M-4 Guadalupe Escarpment Zone 1 (23,187 acres); M-5 Guadalupe Escarpment Zone 2 (17,567 acres); M-6 Washington Ranch Road (5,099 acres); M-7 Highway 62/180 – Scenic Corridor (12,394 acres); M-8 Wildlife Migration/Emigration (10,979 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,034 acres); M-12 Large Delaware Buffer (2,476 acres); M-13 Hope Area Grasslands (108,297); M-14 Chaves Bootheel (288,425); M-15 Community Needs Buffer – Living Desert (2,539); M-16 Community Needs Buffer – Schools (768 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (56,021 acres); M-19 Habitat Area (87,712 acres); M-20 Heronry Buffers (10,945 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,235 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,399 acres); M-24 City of Carlsbad Caprock Water Supply Field (482 acres); M-25 Little Walt Canyon (40 acres);M-26 Airports (845 acres); M-27 State Militia (679 acres). **Recommended for Withdrawal**: M-1 Serpentine Bends (5,493 acres); M-3 Guadalupes (573 acres); M-6 Washington Ranch Road – Scenic Corridor (51 acres); M-7 Highway 62/180 – Scenic Corridor (573 acres); M-8 Wildlife Migration/Emigration (53 acres); M-11 Small Delaware Buffer (157 acres); M-12 Large Delaware Buffer (238 acres); M-18 Sensitive Soils (1,695 acres); M-21 Gnome Site (650 acres) (continue under existing withdrawal); M-22 City of Carlsbad Capitan Water	The M-Polygons listed below are areas where special mineral management prescriptions for locatables on BLM-administered lands would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-2 Eastern Guadalupe Escarpment (5 acres); M-3 Guadalupes (41,981 acres); M-4 Guadalupe Escarpment Zone 1 (14,404 acres); M-5 Guadalupe Escarpment Zone 2 (14,735 acres); M-6 Washington Ranch Road – Scenic Corridor (3,857 acres); M-7 Highway 62/180 – Scenic Corridor (8,449 acres); M-8 Wildlife Migration/Emigration (6,132 acres); M-11 Small Delaware Buffer (4 acres); M-12 Large Delaware Buffer (5 acres); M-13 Hope Area Grasslands (108,140 acres); M-14 Chaves Bootheel (259,817 acres); M-16 Community Needs Buffer – Schools (619 acres); M-18 Sensitive Soils (1 acre); M-19 Habitat Area (140 acres); M-20 Heronry Buffers (11 acres); M-21 Gnome Site Withdrawal (7 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40 acres); M-26 Airports (845 acres). **Recommended for Withdrawal**: M-1 Serpentine Bends (15,558 acres); M-2 Eastern Guadalupe Escarpment (25,529 acres); M-3 Guadalupes (17,064 acres); M-4 Guadalupe Escarpment Zone 1 (8,781 acres); M-5 Guadalupe Escarpment Zone 2 (2,832 acres); M-6 Washington Ranch Road – Scenic Corridor (1,292 acres); M-7 Highway 62/180 – Scenic Corridor (4,517 acres); M-8 Wildlife Migration/Emigration (4,899 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,187 acres) M-12 Large Delaware Buffer (2,710 acres); M-13 Hope Area Grasslands (152 acres); M-14 Chaves Bootheel (28,463 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres) (Note: Subject to city limit drilling requirements.); M-16 Community Needs Buffer – Schools (149 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (57,713	The M-Polygons listed below are areas where special mineral management prescriptions for locatables on BLM-administered lands would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-3 Guadalupes (29,610 acres); M-4 Guadalupe Escarpment Zone 1 (11,420 acres); M-5 Guadalupe Escarpment Zone 2 (11,554 acres); M-11 Small Delaware Buffer (4 acres); M-12 Large Delaware Buffer (5 acres); M-13 Hope Area Grasslands (108,140 acres); M-14 Chaves Bootheel (278,772 acres); M-16 Community Needs Buffer – Schools (1 acre); M-19 Habitat Area (22 acres); M-20 Heronry Buffers (11 acres); M-21 Gnome Site Withdrawal (7 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40 acres); M-26 Airports (845 acres). **Recommended for Withdrawal**: M-1 Serpentine Bends (15,588 acres) (continue under current withdrawal); M-2 Eastern Guadalupe Escarpment (25,529); M-3 Guadalupes (29,431 acres); M-4 Guadalupe Escarpment Zone 1 (11,763 acres); M-5 Guadalupe Escarpment Zone 2 (6,012 acres); M-6 Washington Ranch Road – Scenic Corridor (5,150 acres); M-7 Highway 62/180 – Scenic Corridor (12,967 acres); M-8 Wildlife Migration/Emigration (11,032 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,186 acres); M-12 Large Delaware Buffer (2,709 acres); M-13 Hope Area Grasslands (152 acres); M-14 Chaves Bootheel (9,510 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres) (Note: Subject to city limit drilling requirements.); M-16 Community Needs Buffer – Schools (765 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils, (57,713 acres); M-19 Habitat Area (87,729 acres); M-20 Heronry Buffers (10,931 acres); M-21 Gnome Site Withdrawal (643 acres); M-22 City of Carlsbad	The M-Polygons listed below are areas where special mineral management prescriptions for locatables on BLM-administered lands would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-2 Eastern Guadalupe Escarpment (25,526 acres); M-3 Guadalupes (50,131 acres); M-4 Guadalupe Escarpment Zone 1 (19,288 acres); M-5 Guadalupe Escarpment Zone 2 (16,112 acres); M-6 Washington Ranch Road – Scenic Corridor (3,896 acres); M-7 Highway 62/180 – Scenic Corridor (9,991 acres); M-8 Wildlife Migration/Emigration (9,047 acres); M-9 Steep Slopes (2,716 acres); M-11 Small Delaware Buffer (7 acres); M-12 Large Delaware Buffer (444 acres); M-13 Hope Area Grasslands (108,293 acres); M-14 Chaves Bootheel (288,280 acres); M-16 Community Needs Buffer – Schools (1 acre); M-18 Sensitive Soils (55,636 acres); M-19 Habitat Area (86,936 acres); M-20 Heronry Buffers (10,585 acres); M-21 Gnome Site Withdrawal (7 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,768 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,526 acres); M-24 City of Carlsbad Caprock Water Supply Field (482 acres); M-25 Little Walt Canyon (40 acres); M-26 Airports (845 acres). **Recommended for Withdrawal**: M-1 Serpentine Bends (15,588 acres); M-3 Guadalupes (8,912 acres); M-4 Guadalupe Escarpment Zone 1 (3,895 acres); M-5 Guadalupe Escarpment Zone 2 (1,445 acres); M-6 Washington Ranch Road – Scenic Corridor (1,254 acres); M-7 Highway 62/180 – Scenic Corridor (2,976 acres); M-8 Wildlife Migration/Emigration (1,984 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,185 acres); M-12 Large Delaware Buffer (2,271 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres) (Note: Subject to city limit drilling requirements.); M-16 Community Needs Buffer – Schools (765 acres); M-17 Community Needs Buffer –	The M-Polygons listed below are areas where special mineral management prescriptions for locatables on BLM-administered lands would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-2 Eastern Guadalupe Escarpment (25,526 acres); M-3 Guadalupes (56,031 acres); M-4 Guadalupe Escarpment Zone 1 (23,187 acres); M-5 Guadalupe Escarpment Zone 2 (16,234 acres); M-6 Washington Ranch Road – Scenic Corridor (4,433 acres); M-7 Highway 62/180 – Scenic Corridor (11,343 acres); M-8 Wildlife Migration/Emigration (9,430 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (587 acres); M-11 Small Delaware Buffer (6 acres); M-12 Large Delaware Buffer (443 acres); M-13 Hope Area Grasslands (108,293 acres); M-14 Chaves Bootheel (288,282 acres); M-16 Community Needs Buffer – Schools (1 acre); M-18 Sensitive Soils (55,879 acres); M-19 Habitat Area (86,936 acres); M-20 Heronry Buffers (10,585 acres); M-21 Gnome Site Withdrawal (7 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,768 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,526 acres); M-24 City of Carlsbad Caprock Water Supply Field (482 acres); M-25 Little Walt Canyon (40 acres); M-26 Airports (845 acres). **Recommended for Withdrawal**: M-1 Serpentine Bends (15,588 acres) (continue under current withdrawal); M-3 Guadalupes (3,016 acres); M-5 Guadalupe Escarpment Zone 2 (1,333 acres); M-6 Washington Ranch Road – Scenic Corridor (717 acres); M-7 Highway 62/180 – Scenic Corridor (1,623 acres); M-8 Wildlife Migration/Emigration (1,601 acres); M-10 Black River Management Area (64 acres); M-11 Small Delaware Buffer (2,183 acres); M-12 Large Delaware Buffer (2,269 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres) (Note: Subject to city limit drilling requirements.); M-16 Community Needs Buffer –

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Supply Field (671 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (265 acres).	acres); M-19 Habitat Area (87,611 acres); M-20 Heronry Buffers (10,931); M-21 Gnome Site Withdrawal (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,905 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,664 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-27 State Militia (679 acres).	Capitan Water Supply Field (21,905 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,664 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-27 State Militia (679 acres).	East Carlsbad (201 acres); M-18 Sensitive Soils (2,078 acres); M-19 Habitat Area (808 acres); M-20 Heronry Buffers (360 acres); M-21 Gnome Site (643 acres) (continue under existing withdrawal); M-22 City of Carlsbad Capitan Water Supply Field (138 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (138 acres); M-27 State Militia (679 acres).	Schools (765 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (1,836 acres); M-19 Habitat Area (808 acres); M-20 Heronry Buffers (360 acres); M-21 Gnome Site (643 acres) (continue under existing withdrawal); M-22 City of Carlsbad Capitan Water Supply Field (138 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (138 acres); M-27 State Militia (679 acres).

2.20 MINERALS – SALABLES

2.20.1 Goals

1. Provide for salable mineral development compatible with other resources.

2.20.2 Objectives

1. Provide salable minerals needed for community and economic purposes and facilitate their reasonable, economical, and environmentally sound development where available and compatible with resource objectives.

2.20.3 Management Common to All Alternatives

1. The BLM would manage and facilitate the development by private industry of public land mineral resources so that national and local needs are met, and environmentally sound exploration, extraction, and reclamation practices are used.
2. The BLM would monitor salable mineral operations to ensure proper resource recovery and evaluation, production verification, and diligence in inspection and enforcement of the lease, sale, or permit terms.
3. Management guidance for mineral materials is contained in the Environmental Assessment on Mineral Material Sales and Permits in the Roswell District, which is incorporated by reference.

Note: A concerted effort was made by the Interdisciplinary Team to identify and propose to open as many areas as possible to salable minerals while also managing resources. Those areas that remain proposed as closed to salables were carefully examined to ensure the areas are as small as necessary in order to adequately manage resources of concern. For salable development, “open” means open with standard terms and conditions. “Open with special terms and conditions” means it would be open to salable development but would have stipulations applied. “Closed to salable development” also means closed to all types of mineral material disposal actions.

Table 2-12. Alternatives for Salable Minerals

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
For BLM-administered lands within the planning area, salable minerals would be managed under the following leasing categories (Map 2-23): • Open (2,637,465 acres) • Open with special terms and conditions (0 acres) • Closed (146,568 acres) includes all or part of the following proposed ACECs: Blue Springs Riparian ACEC, Bluntnose Shiner ACEC, Cave Resources ACEC, Carlsbad Chihuahuan Desert ACEC, Chosa Draw ACEC, Desert Heronries ACEC, Gypsum Soils ACEC, Laguna Plata ACEC, Lonesome Ridge ACEC, Maroon Cliffs ACEC, Pecos River/ Canyons Complex ACEC, Pope's Well ACEC, Salt Playa ACEC, Serpentine Bends ACEC, Six Shooter ACEC, Seven Rivers Hills ACEC **Total**: 2,784,033 acres Note: Differences in total acreages between alternatives can vary up to 250 acres due to the intersection of GIS shapefiles that create "slivers" when two or more layers are intersected with the BLM ownership layer.	For BLM-administered lands within the planning area, salable minerals would be managed under the following leasing categories (Map 2-24): • Open (1,160,064 acres) • Open with special terms and conditions (1,062,192 acres) • Closed (561,995 acres) includes all or part of the following proposed ACECs: Blue Springs Riparian ACEC, the Birds of Prey ACEC, Bluntnose Shiner ACEC, Boothill Hill ACEC, Cave Resources ACEC, Carlsbad Chihuahuan Desert ACEC, Chosa Draw ACEC, Desert Heronries ACEC, Gypsum Soils ACEC, Laguna Plata ACEC, Lonesome Ridge ACEC, Maroon Cliffs ACEC, Pecos River/ Canyons Complex ACEC, Pope's Well ACEC, Salt Playa ACEC, Serpentine Bends ACEC, Six Shooter ACEC, Seven Rivers Hills ACEC **Total:** 2,784,251 acres	For BLM-administered lands within the planning area, salable minerals would be managed under the following leasing categories (Map 2-25): • Open (1,121,118 acres) • Open with special terms and conditions (726,270 acres) • Closed (936,799 acres) includes all or part of the following proposed ACECs: Blue Springs Riparian ACEC, Birds of Prey ACEC, Bluntnose Shiner ACEC, Boothill Hill ACEC, Cave Resources ACEC, Carlsbad Chihuahuan Desert ACEC, Chosa Draw ACEC, Desert Heronries ACEC, Gypsum Soils ACEC, Laguna Plata ACEC, Lonesome Ridge ACEC, Maroon Cliffs ACEC, Pecos River/ Canyons Complex ACEC, Pope's Well ACEC, Salt Playa ACEC, Serpentine Bends ACEC, Six Shooter ACEC, Seven Rivers Hills ACEC **Total:** 2,784,186 acres	For BLM-administered lands within the planning area, salable minerals would be managed under the following leasing categories (Map 2-26): • Open (1,784,431 acres) • Open with special terms and conditions (752,286 acres) • Closed (247,323 acres) including all or part of the following proposed ACECs: Blue Springs Riparian ACEC, Birds of Prey ACEC, Bluntnose Shiner ACEC, Boothill Hill ACEC, Cave Resources ACEC, Carlsbad Chihuahuan Desert ACEC, Chosa Draw ACEC, Desert Heronries ACEC, portions of the Gypsum Soils ACEC, Laguna Plata ACEC, Lonesome Ridge ACEC, Maroon Cliffs ACEC, Pecos River/ Canyons Complex ACEC, Pope's Well ACEC, Salt Playa ACEC, Serpentine Bends ACEC, Seven Rivers Hills ACEC **Total:** 2,784,041 acres	For BLM-administered lands within the planning area, salable minerals would be managed under the following leasing categories (Map 2-27): • Open (2,028,324 acres) • Open with special terms and conditions (602,621 acres) • Closed (153,174 acres) includes all or part of the following proposed ACECs: Blue Springs Riparian ACEC, Bluntnose Shiner ACEC, Boothill Hill ACEC, Cave Resources ACEC, Carlsbad Chihuahuan Desert ACEC, Chosa Draw ACEC, Desert Heronries ACEC, portions of the Gypsum Soils ACEC, Laguna Plata ACEC, Lonesome Ridge ACEC, Maroon Cliffs ACEC, Pecos River/ Canyons Complex ACEC, Pope's Well ACEC, Salt Playa ACEC, Serpentine Bends ACEC, Seven Rivers Hills ACEC. **Total:** 2,784,119 acres
There is no management specific to M-Polygons under the No Action Alternative. However, for analysis purposes the M-Polygons are managed as follows (Map 2-12). **Open with standard terms**: M-1 Serpentine Bends (886 acres); M-2 Eastern Guadalupe Escarpment (23,813 acres); M-3 Guadalupes (47,201 acres); M-4 Guadalupe Escarpment Zone 1 (13,147 acres); M-5 Guadalupe Escarpment Zone 2 (17,567 acres); M-6 Washington Ranch Road – Scenic Corridor (5,051 acres); M-7 Highway 62/180 – Scenic Corridor (11,152 acres); M-8 Wildlife Migration/Emigration (10,532 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,034 acres); M-12 Large Delaware Buffer (2,476 acres); M-13 Hope Area Grasslands (108,292 acres); M-14 Chaves Bootheel (288,425 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-16 Community Needs Buffer – Schools (767 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (54,537 acres); M-19 Habitat Area (87,014 acres); M-20 Heronry Buffers (5,506 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,234 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,399 acres); M-24 City of Carlsbad	The M-Polygons listed below are areas where special mineral management prescriptions for salables would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-3 Guadalupes (13,685 acres); M-5 Guadalupe Escarpment Zone 2 (2 acres); M-6 Washington Ranch Road – Scenic Corridor (5,051 acres); M-7: Highway 62/180 – Scenic Corridor (5,711 acres); M-12 Large Delaware Buffer (4 acres); M-13 Hope Area Grasslands (10 acres); M-14 Chaves Bootheel (239,462 acres); M-16 Community Needs Buffer – Schools (619 acres); M-19 Habitat Area (22 acres); M-21 Gnome Site Withdrawal (7 acres). **Open with special terms and conditions**: M-3 Guadalupes (33 acres); M-7: Highway 62/180 – Scenic Corridor (33 acres); M-13 Hope Area Grasslands (18,433 acres); M-14 Chaves Bootheel 239,462 acres); M-19 Habitat Area (78 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40 acres). **Closed**: M-1 Serpentine Bends (15,588 acres); M-2 Eastern Guadalupe Escarpment (25,529 acres); M-3 Guadalupes (45,327 acres); M-4 Guadalupe Escarpment Zone 1 (23,185 acres); M-5 Guadalupe Escarpment Zone 2 (17,563 acres); M-6 Washington Ranch Road – Scenic Corridor (5,022 acres); M-7:	The M-Polygons listed below are areas where special mineral management prescriptions for salables would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-3 Guadalupes (374 acres); M-7 Hwy 62/180 – Scenic Corridor (374 acres); M-8 Wildlife Migration/ Emigration Corridor (7 acres); M-11 Small Delaware Buffer (5 acres); M-12 Large Delaware Buffer (5 acres); M-13 Hope Area Grasslands (10 acres); M-14 Chaves Bootheel (2 acres); M-16 Community Needs Buffer – Schools (379 acres); M-20 Heronry Buffers (11 acres); M-21 Gnome Site Withdrawal (7 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres). **Open with special terms and conditions:** M-3 Guadalupes (7,859 acres); M-5 Guadalupe Escarpment Zone 2 (2 acres); M-13 Hope Area Grasslands (5,818 acres); M-14 Chaves Bootheel (234,625 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres); M-25 Little Walt Canyon (40 acres). **Closed**: M-1 Serpentine Bends (15,588 acres); M-2 Eastern Guadalupe Escarpment (25,489 acres); M-3 Guadalupes (50,812 acres); M-4 Guadalupe Escarpment Zone 1 (23,185 acres); M-5 Guadalupe Escarpment Zone 2 (17,563 acres); M-6 Washington Ranch Road – Scenic Corridor (5,149 acres); M-7	The M-Polygons listed below are areas where special mineral management prescriptions for salables would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open:** M-2 Eastern Guadalupe Escarpment (1 acre); M-8 Wildlife Migration/Emigration Corridor (4,860 acres); M-11 Small Delaware Buffer (6 acres); M-12 Large Delaware Buffer (443 acres); M-13 Hope Area Grasslands (18,451 acres); M-14 Chaves Bootheel (248,206 acres); M-16 Community Needs Buffer – Schools (1 acre); M-18 Sensitive Soils (7 acres); M-19 Habitat Area (42 acres); M-20 Heronry Buffers (10,485 acres); M-21 Gnome Site Withdrawal (7 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,767 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,526 acres). M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-25 Little Walt Canyon (40 acres). **Open with special terms and conditions**: M-2 Eastern Guadalupe Escarpment (25,525 acres); M-3 Guadalupes (30,840 acres); M-5 Guadalupe Escarpment Zone 2 (15,005 acres); M-6 Washington Ranch Rd – Scenic Corridor (2,150 acres); M-7 Hwy 62/180 – Scenic Corridor (7,619 acres); M-8 Wildlife Migration/ Emigration Corridor (3,377 acres); M-9 Steep Slopes (2,716 acres); M-13 Hope Area Grasslands (89,641 acres); M-14 Chaves Bootheel	The M-Polygons listed below are areas where special mineral management prescriptions for salables would be needed to protect various resources that are not covered under other prescriptions (Map 2-12). **Open**: M-2 Eastern Guadalupe Escarpment (25,526 acres); M-3 Guadalupes (16,418 acres); M-5 Guadalupe Escarpment Zone 2 (3 acres); M-6 Washington Ranch Road – Scenic Corridor (232 acres); M-7 Highway 62/180 – Scenic Corridor (7,611 acres); M-8 Wildlife Migration/Emigration (7,640 acres); M-10 Black River Management Area (476 acres); M-11 Small Delaware Buffer (6 acres); M-12 Large Delaware Buffer (443 acres); M-13 Hope Area Grasslands (18,429 acres); M-14 Chaves Bootheel (276,795 acres); M-16 Community Needs Buffer – Schools (619 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (55,044 acres); M-19 Habitat Area (43 acres); M-20 Heronry Buffers (10,585 acres); M-21 Gnome Site Withdrawal (7 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,767 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,526 acres); M-24 City of Carlsbad Caprock Water Supply Field (482 acres); M-25 Little Walt Canyon (40 acres). **Open with special terms and conditions**: M-3 Guadalupes (17,571 acres); M-5 Guadalupe Escarpment Zone 2 (16,140 acres); M-6: Washington

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Caprock Water Supply Field (482 acres); M-25 Little Walt Canyon (40 acres); M-26 Airports (845 acres). **Open with special terms and conditions**: None. **Closed**: M-1 Serpentine Bends (14,702 acres); M-2 Eastern Guadalupe Escarpment (1,724 acres); M-3 Guadalupes (11,847 acres); M-4 Guadalupe Escarpment Zone 1 (10,040 acres); M-6 Washington Ranch Road – Scenic Corridor (98 acres); M-7 Highway 62/180 – Scenic Corridor (1,816 acres); M-8 Wildlife Migration/Emigration (499 acres); M-11 Small Delaware Buffer (157 acres); M-12 Large Delaware Buffer (238 acres); M-18 Sensitive Soils (3,177 acres); M-19 Habitat Area (808 acres); M-20 Heronry Buffers (5,439 acres); M-21 Gnome Site (650 acres); M-22 City of Carlsbad Capitan Water Supply Field (671 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (265 acres); M-27 State Militia (679 acres).	Highway 62/180 – Scenic Corridor (7,224 acres); M-8 Wildlife Migration/Emigration (11,033 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,188 acres); M-12 Large Delaware Buffer (2,710 acres); M-13 Hope Area Grasslands (89,836 acres); M-14 Chaves Bootheel (39,949 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-16 Community Needs Buffer – Schools (149 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (57,715 acres); M-19 Habitat Area (87,612 acres); M-20 Heronry Buffers (10,931 acres); M-21 Gnome Site (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,905 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,664 acres); M-24 City of Carlsbad Caprock Water Supply Field (40 acres); M-26 Airports (845); M-27 State Militia (679 acres).	Highway 62/180 – Scenic Corridor (12,593 acres); M-8 Wildlife Migration/Emigration (11,022 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,186 acres); M-12: Large Delaware Buffer (2,709 acres); M-13 Hope Area Grasslands (102,451 acres); M-14 Chaves Bootheel (53,788 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-16 Community Needs Buffer – Schools (389 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (57,714 acres); M-19 Habitat Area (87,712 acres); M-20 Heronry Buffers (10,931 acres); M-21 Gnome Site Withdrawal (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (21,905 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (7,664 acres); M-26 Airports (845); M-27 State Militia (679 acres).	(40,049 acres); M-18 Sensitive Soils (55,191 acres); M-19 Habitat Area (98 acres); M-20 Heronry Buffers (100 acres); M-24 City of Carlsbad Caprock Water Supply Field (442 acres). **Closed**: M-1 Serpentine Bends (15,588 acres); M-3 Guadalupes (28,206 acres); M-4 Guadalupe Escarpment Zone 1 (23,185 acres); M-5 Guadalupe Escarpment Zone 2 (2,561 acres); M-6 Washington Ranch Road – Scenic Corridor (2,998 acres); M-7 Highway 62/180 – Scenic Corridor (5,348 acres); M-8 Wildlife Migration/Emigration (2,795 acres); M-10 Black River Management Area (650 acres); M-11 Small Delaware Buffer (2,183 acres); M-12 Large Delaware Buffer (2,269 acres); M-13 Hope Area Grasslands (200 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-16 Community Needs Buffer – Schools (765 acres); M-17 Community Needs Buffer – East Carlsbad (201 acres); M-18 Sensitive Soils (2,569 acres); M-19 Habitat Area (87,612 acres); M-20 Heronry Buffers (360 acres); M-21 Gnome Site Withdrawal (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (138 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (138 acres); M-26 Airports (845); M-27 State Militia (679 acres).	Ranch Road – Scenic Corridor (3,191 acres); M-7 Highway 62/180 – Scenic Corridor (1,924 acres); M-8 Wildlife Migration/Emigration (688 acres); M-9 Steep Slopes (2,716 acres); M-10 Black River Management Area (111 acres); M-13 Hope Area Grasslands (89,664 acres); M-14 Chaves Bootheel (11,487 acres); M-18 Sensitive Soils (402 acres); M-19 Habitat Area (84,594 acres). **Closed**: M-1 Serpentine Bends (15,588 acres); M-3 Guadalupes (25,054 acres); M-4 Guadalupe Escarpment Zone 1 (23,180 acres); M-5 Guadalupe Escarpment Zone 2 (1,422 acres); M-6 Washington Ranch Road – Scenic Corridor (1,727 acres); M-7 Highway 62/180 – Scenic Corridor (3,429 acres); M-8 Wildlife Migration/Emigration Corridor (2,703 acres); M-10 Black River Management Area (64 acres); M-11 Small Delaware Buffer (2,183 acres); M-12 Large Delaware Buffer (2,269 acres); M-13 Hope Area Grasslands (200 acres); M-15 Community Needs Buffer – Living Desert (2,539 acres); M-16 Community Needs Buffer – Schools (149 acres); M-18 Sensitive Soils (2,269 acres); M-19 Habitat Area (3,114 acres); M-20 Heronry Buffers (360 acres); M-21 Gnome Site Withdrawal (643 acres); M-22 City of Carlsbad Capitan Water Supply Field (138 acres); M-23 City of Carlsbad Capitan Water Supply Field Proper (138 acres); M-26 Airports (845); M-27 State Militia (679 acres).

2.21 RENEWABLE ENERGY

2.21.1 Goals

1. Manage suitable public lands for the development of renewable energy (e.g., wind and solar).

2.21.2 Objectives

1. Allow for renewable energy development while protecting other resource values.

2.21.3 Management Common to All Alternatives

1. Three years of baseline bird and bat use surveys and 2 years of post-construction mortality surveys would be required as part of the application to permit either solar or wind energy sites on public land within the planning area.
2. Programmatic policies and BMPs in the ROD for the Implementation of a Wind Energy Development Program and associated Land Use Plan Amendments (BLM 2005) have been adopted and would be used by the BLM.
3. Programmatic policies and BMPs in the Approved RMP Amendments/ROD for Solar Energy Development in Six Southwestern States (BLM 2012a) would be adopted.

2.21.4 Management Common to All Action Alternatives (actions that apply to Alternatives A, B, C, and D only)

1. Wind development would be encouraged in areas where transmission corridors are located, where transmission systems are already in place, or are not proposed in any of the exclusion and avoidance areas listed below.

Table 2-13. Alternatives for Renewable Energy

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
WSAs and WSRs would be excluded from wind and solar development and closed to geothermal development. Wind energy development would be restricted in those areas along the face of the Guadalupe Mountains located in the western portion of the planning area and grassland areas in the northwestern portion of the planning area. Applications to permit either solar or wind energy sites on public land within the planning area would be considered if the applicant can demonstrate no negative impacts on avian and bat species. Wind energy development would be restricted in those areas near Carlsbad Caverns National Park that are designated as VRM Class I and II. Wind energy development would be restricted in those areas that are within the Guadalupe National Backcountry Byway and Guadalupe Escarpment Scenic Area (VRM Class II). Wind energy development would be restricted in those areas that are within known cave/karst occurrence within the planning area (withdrawn lands). Wind energy development would be restricted in designated SMAs: ACECs, archaeological districts, and TCPs. Designated and proposed critical habitat for federally threatened and endangered species: Applications to permit either solar or wind energy sites on public land within the planning area would be considered if the applicant can demonstrate no negative impacts on avian and bat species. Designated and proposed critical habitat for federally threatened and endangered species: Wind energy development would be restricted in those areas along the face of the Guadalupe Mountains located in the western portion of the planning area and grassland areas in the northwestern portion of the planning area.	The following areas would be excluded from wind and solar development and closed to geothermal development (Map 2-28a, 2.29a, and 2.30a): • WSAs • Lands managed to protect wilderness characteristics • Suitable WSRs • SRMAs • ERMAs • VRM Class I and II areas • Archaeological districts and TCPs • Habitat areas • Wetlands and riparian areas (7,248 acres) • 100-year floodplains • In those areas that are within known karst areas • In those areas along the face of the Guadalupe Mountains located in the western portion of the planning area • Aplomado falcon grasslands/Chaves County Bootheel area (Map 3-9) • Designated and proposed critical habitat for federal threatened and endangered species • ACECs would be subject to the individual ACEC management prescriptions	Same as Alternative A, except wind development would be avoided not excluded in ERMAs and avoided in habitat for federal listed/proposed threatened and endangered species for which critical habitat has not been designated (see 2.28b, 2.29b, and 2.30b).	Same as Alternative B, except wind and geothermal development would also be avoided not excluded in the grassland areas in the northwestern portion of the planning area (Chaves County, Bootheel) (see 2.28c, 2.29c, and 2.30c).	Same as Alternative B, except solar development would be avoided in ERMAs, and wild development would be open in the Chaves County and Bootheel areas (see 2.28d, 2.29d, and 2.30d).
The Solar Programmatic EIS identifies the majority of the planning area as excluded for solar development. Other areas that are not identified as exclusion would be managed as variance areas (approximately 271,504 acres). Variance areas are defined as an area that may be available for a utility-scale solar energy ROW with special stipulations or considerations. The BLM would consider ROW applications for utility-scale solar energy development in variance areas on a case-by-case basis based on environmental considerations.	Same as the No Action Alternative. Solar exclusion areas from the Programmatic Solar EIS would be adopted unless superseded by a resource decision in this revision.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Sensitive Soils**:** Wind energy development would be restricted in designated SMAs.	Solar, wind and geothermal development would be excluded in areas with sensitive soils (areas delineated under minerals allocations).	Same as Alternative A.	Wind and geothermal development would be avoided in areas of sensitive soils. Solar development would be excluded.	Same as Alternative C.

2.22 LIVESTOCK GRAZING

2.22.1 Goals

1. Manage livestock grazing to ensure achievement of or movement toward meeting the New Mexico Standards for the Public Land Health and Guidelines for Livestock Grazing Management (BLM 2001).
2. Provide for livestock grazing through application of proper grazing management to enhance and sustain existing and historic uses and to improve habitat for native wildlife.
3. Provide for livestock grazing through application of proper grazing management to maintain or improve the condition of vegetative resources, contribute to healthy sustainable ecosystems, clean water, and functional watersheds, while maintaining native plant communities.
4. Provide for livestock grazing through application of proper grazing management to support restoration of the resiliency of ecosystem structure and function and to reduce fragmentation of habitat for native wildlife species.
5. Provide for livestock grazing through application of proper grazing management to move vegetation toward DPC that provide habitat native species.

2.22.2 Objectives

1. Establish livestock grazing systems and practices that recognize the physiological requirements of forbs and shrubs.
2. Manage livestock grazing to help maintain and improve native plant species diversity and abundance, focusing on plant reproductive and physiological needs.
3. Continue planning, implementing, and improving grazing management practices to meet riparian needs and water quality standards.
4. Restore, maintain, and/or improve rangeland conditions and productivity to maintain, meet, or make substantial progress toward meeting rangeland health standards.
5. Achieve the attainment of Standards for Rangeland Health and other desired resource conditions by maintaining appropriate utilization levels of the range through management prescriptions and administrative adjustments of grazing permits.
6. Achieve healthy, sustainable rangeland ecosystems that support the livestock industry while providing for other resource values such as wildlife habitat, recreation opportunities, clean water, and functional watersheds.
7. Maintain or improve the total vegetative resource using techniques that are compatible with the use and development of other resources and that would maintain, meet, or make substantial progress toward meeting New Mexico BLM Standards for Rangeland Health.
8. Manage to achieve the New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management (BLM 2001) and other desired resource conditions through the implementation of these standards.

At the implementation phase, after the record of decision for the RMP has been signed, monitoring objectives would be developed. Monitoring objectives would include monitoring indicators, the condition determination method, the condition benchmarks, a time objective for achieving the desired results, and the proportion required to meet the benchmark. The data would be used to determine landscape condition and inform management decisions.

2.22.3 Management Common to All Action Alternatives

1. Along the Pecos River the number of livestock and season of use would be established on an allotment basis to ensure adequate growing season rest within riparian pastures.

Table 2-14. Alternatives for Livestock Grazing

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Allocations				
Approximately 2,086,107 acres (366,738 animal unit months [AUMs]) would be available for livestock grazing within the planning area (Map 2-32), including 5,000 acres of unallotted tracts and the Black River outside of the management area (small BLM portion). The unallotted tracts would generally remain available for future livestock grazing, as provided for in the BLM grazing regulations. Approximately 5,226 acres would be closed to grazing, including the following areas: • 3 SMAs in order to reduce conflicts between sensitive riparian habitats, fragile watersheds, RNAs, and other multiple-use values. The SMAs are Cottonwood Spring, Ben Slaughter Spring, and Pope's Well Arch. • Cottonwood Spring • Ben Slaughter Spring • Popes Well Historic Site • The Pecos River riparian area would be open to grazing with the exception of the RNA of the Pecos Rivers Canyons/Complex ACEC, bluntnose shiner habitat, and the Red Bluff area. The RNA and the Red Bluff area are currently permitted. • The Black River Management Area • The Delaware River (both sides of U.S. 285): Grazing would be closed during the active season (April – October) but would be allowed during the dormant season use (November–March). • The following riparian springs would be closed: Bogle Flat, Preservation, Cottonwood, Owl, Ben Slaughter, and Blue Spring (if acquired).	The majority of the planning area would be available for livestock grazing (1,598,198 acres, 280,965 AUMs). The following areas would not be available for livestock grazing (493,120 acres, 86,691 AUMs) (Map 2-33): • 5,000 acres of unallotted tracts would be closed to grazing, and available vegetation would be made exclusively available for wildlife and watershed health • Carlsbad Chihuahuan Desert Rivers ACEC • Pecos Bluntnose Shiner ACEC • Pope's Well area (not an ACEC under this alternative but would be closed) • Known heronries • Eastern Guadalupe Escarpment HMA (includes the former South Texas Hill RNA • Desert Heronries ACEC • Conoco Lake • Federal Law Enforcement Training Center (FLETC) • Brantley • Red Bluff Reservoir • Birds of Prey ACEC • Black River Management Area. Note that on the Black River outside of the management area (small BLM portion), livestock grazing would be removed within 656 feet of the riverbank on either side. The area would be fenced out where necessary. • Delaware (both sides of U.S. 285). However, grazing would be allowed during dormant season use (November–March). • Riparian springs and their associated riparian zones	The majority of the planning area would be available for livestock grazing (1,937,725 acres, 340,656 AUMs). The following areas would not be available for livestock grazing (153,583 acres, 27,000 AUMs) (Map 2-34): • 5,000 acres of unallotted tracts would be closed to grazing, available vegetation would be made exclusively available for wildlife and watershed health • Pierce Canyon, Yeso Hills • Laguna Plata ACEC • Maroon Cliffs ACEC • Open OHV areas or excluded from just the dune areas of Hackberry • Gypsum Soils ACEC • Pecos Bluntnose Shiner ACEC • Pope's Well ACEC. • Eastern Guadalupe Escarpment HMA (includes the South Texas Hill RNA) • Desert Heronries ACEC • Conoco Lake • FLETC • Brantley • Red Bluff Reservoir • Black River Management Area. Note that on the Black River outside of the management area (small BLM portion) livestock grazing would be removed within 656 feet of the river bank on either side. The area would be fenced where necessary. • Delaware (Both sides of U.S. 285): Livestock grazing would be removed from seasonal pastures. • Riparian springs and their associated riparian zones	The majority of the planning area would be available for livestock grazing (2,083,232 acres, 366,229 AUMs), including 5,000 acres of unallotted tracts and the Black River outside of the management area (small BLM portion). The following areas would not be available for livestock grazing (8,115 acres, 1,427 AUMs) (Map 2-35): • Pecos Bluntnose Shiner ACEC • Pope's Well area (not an ACEC under this alternative but would still be closed) Conoco Lake • FLETC • Brantley • Red Bluff Reservoir • Black River Management Area • Delaware (both sides of U.S. 285). Grazing would be closed during the active season (April – October) but would be allowed during the dormant season (November–March). The BLM would negotiate with the grazing permittee to fence the south side and provide offsite water. • Riparian springs and their associated riparian zones	The majority of the planning area would be available for livestock grazing (2,087,759 acres, 367,024 AUMs), including 5,000 acres of unallotted tracts; the Delaware (both sides of U.S. 285) where grazing would be allowed during dormant season use (November–March); and the Black River outside of the management area (small BLM portion). The following areas would not be available for livestock grazing (3,594 acres, 632 AUMs) (Map 2-36): • Pecos Bluntnose Shiner ACEC • Pope's Well area (not an ACEC under this alternative but would still be closed) • Conoco Lake • FLETC • Brantley • Red Bluff Reservoir • Black River Management Area • Riparian springs and their associated riparian zones

2.23 TRAVEL AND TRANSPORTATION MANAGEMENT

2.23.1 Goals

1. Manage and provide for motorized, non-motorized, and non-mechanized access that would balance resource protection and uses.

2.23.2 Objectives

1. Provide a safe and effective transportation and travel system that facilitates multiple uses with an emphasis on meeting native vegetation and special status species goals, wildland fire prevention/suppression, and emergency response activities, dispersing OHV recreation, recreational use, livestock grazing, and energy development while minimizing impacts to wildlife habitat and native vegetation.
2. Maintain opportunities for motorized and non-motorized travel throughout the planning area.
3. Manage the existing BLM motorized travel network (roads, primitive roads, and trails) to mitigate impacts to species with viability concerns.

2.23.3 Management Common to All Alternatives

The following definitions from BLM Manual H-8342 would be used for travel and transportation planning purposes:

Road: A linear route declared a road by the owner, managed for use by low-clearance vehicles having four or more wheels, and maintained for regular and continuous use. These may include ROW roads granted by the BLM to other entities.

Primitive Road: A linear route managed for use by four-wheel drive or high-clearance vehicles. These routes do not normally meet any BLM road design standards.

Trail: A linear route managed for human-powered, stock, or off-highway vehicle forms of transportation or for historical or heritage values. Trails are not generally managed for use by four-wheel drive or high-clearance vehicles.

Off-road vehicle (ORV) as defined in 43 CFR 8340.0-5 means any motorized vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding 1) any non-amphibious registered motorboat; 2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; 3) any vehicle whose use is expressly authorized by the Authorized Officer, or otherwise officially approved; 4) vehicles in official use; and 5) any combat or combat support vehicle when used in times of national defense emergencies.

Off Highway Vehicle (OHV) as defined by the State of New Mexico is a motor vehicle designed by the manufacturer for operation exclusively off the highway or road. For the purposes of this planning document the term "OHV" is considered synonymous with "ORV."

In addition to New Mexico State laws and regulations, OHV use is governed by 43 CFR 8341.1 as outlined at the end of Appendix G – New Mexico Supplementary Rules.

1. Modification of permits or leases could be required to limit motorized wheeled cross-country travel during further site-specific analysis to meet resource management objectives or standards and guidelines.
2. Phantom Banks Heronries would be designated as limited to OHV use.
3. Emergency OHV limitations may be imposed in problem areas.
4. To clarify the intent of the 1997 Roswell RMP and to bring the 1988 Carlsbad RMP up to date, within the planning area, motorized wheeled cross-country travel would be allowed for any military, fire, search and rescue, or law enforcement vehicle used for emergency purposes.
5. Disabled access would be allowed per the Rehabilitation Act of 1973. Under the act, an individual with a disability would not, solely by reason of his or her disability, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity conducted by the BLM. Disabled access per the Rehabilitation Act is considered at the local level on a case-by-case basis. Motorized wheelchairs, as defined in the Rehabilitation Act, are not considered OHVs and therefore would not be restricted by any of the alternatives.
6. Motorized wheeled cross-country travel for lessees and permittees would be limited to the administration of a BLM lease or permit. Persons or corporations having such a permit or lease would be able to perform administrative functions on public land within the scope of the permit or lease. Lessees and permittees would not be allowed to drive cross-country for hunting, fishing, recreation, or other purposes not directly related to the administration of their federal permit or lease.
7. Access management decisions would be implemented through the OHV designation process, activity planning, land use authorizations, or normal road abandonment procedures. All authorization decisions that have a travel and transportation management component must specifically address changes to the travel network.
8. The construction, maintenance, rehabilitation, abandonment, and closure of all roads subject to BLM jurisdiction would be conducted according to the BLM's Road Policy, Standards and Procedures (BLM 1997, Road). Additional policy and guidance for construction, maintenance, rehabilitation, abandonment, and closure of roads can be found in BLM Manual 9113-1 (BLM 2011a) and BLM Manual 9113-2 Roads Design Handbook (BLM 2011b), BLM Manual 9115 Roads National Inventory and Condition Assessment and Guidance & Instructions Handbook (BLM 2012b), and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development – the Gold Book (BLM 2007b).
9. The BLM may monitor use of roads and notify join-cost-sharing companies when maintenance is needed.
10. Oil and gas development roads would be constructed and maintained per BLM's Surface Operating Standards and Guidelines for Oil and Gas Development – the Gold Book (BLM 2007b).

2.23.4 Management Common to All Action Alternatives (actions that apply to Alternatives A, B, C, and D only)

1. Roads, primitive roads, and trails may be allowed to cross segments of archaeological districts in areas where previous disturbance has occurred after consultation with the New Mexico State Historic Preservation Office.
2. All surfacing material on oil and gas roads must be removed at the time of abandonment. No surfacing material would be left on the roadway. Where necessary for access purposes, the roadway would remain an unsurfaced primitive road.

Table 2-15. Alternatives for Travel and Transportation Management

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Travel in WSAs would be managed per *BLM Manual 6330 – Management of Wilderness Study Areas* (BLM 2012c).	In WSAs, the BLM may permit motorized and mechanized use to continue along existing routes identified in the wilderness inventory conducted in support of sections 603 and 202 of FLPMA. In these cases, the BLM delays final route classification until Congress takes action or the final land use plan decision is to close those routes to motorized and mechanized use. The BLM would not designate primitive roads and motorized/mechanized trails within WSAs and would not classify them as assets. The BLM would identify any motorized/mechanized transportation linear feature located within these areas in a transportation inventory as a motorized/mechanized "primitive route."	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Within the planning area, inventories, public review, and transportation planning would be conducted to support road-by-road designations for roads and trails suitable for OHV use. Pending completion of formal designations, the planning area would be managed as OHV limited (607,644 acres) unless otherwise specified in the plan. Approximately 5,748 acres would be managed as limited to designated for travel (Map 2-37). • The portion of the Hackberry Lake OHV Area (22,673 acres) located within the planning area would be OHV limited with the exception of 132 acres of dune complex, known as the Shugart Dunes, which would remain open. OHVs: Sixteen areas covering 153,299 acres would be designated limited for OHV use. A total of 5,943 acres would be designated closed to OHV use. Approximately 2,011,506 acres would be designated open for OHV use. • The 900-acre Alkali Lake and the 55,800-acre Hackberry Lake OHV Areas are the preferred locations for recreational, commercial, and organized competitive OHV events. These areas would be managed to ensure that other land and resource uses would not significantly interfere with organized recreational OHV use. • Legal and/or physical access for general public use and BLM administration is planned to be obtained in six high-priority, 11 moderate-priority, and eight low-priority access tracts. Access management plans would be prepared to determine the best available method for providing access to public lands within specific tracts • The existing OHV closure for the Laguna Plata area would continue; the Pope's Well area would be closed to OHV use, and vehicles would be limited to designated routes in the Maroon Cliffs, Potash Bull Wheel, Poco Site, and Bear Grass Draw areas. • Lonesome Ridge ACEC (2,990-acre SMA): Designate closed to OHV use and implement plan to enforce designations. • Springs Riparian Habitat SMAs: Designate closed to OHV use and implement plan to enforce designations. • Little McKittrick Draw: Designate closed to OHV use and implement plan to enforce designations. • Potash Bull Wheel: Designate closed to OHV use. • Pope's Well: Designate closed to OHV use and implement plan to enforce designations. • Pecos River/Canyon Complex: Designate 1,215 acres closed to OHV use and the remaining 3,975 acres limited to designated routes. Implement plan to enforce designations. **Pecos River Corridor:** • Designate 120 acres around Red Bluff Reservoir closed to OHV use and the remaining 5,880 acres as limited to designated routes. Implement plan to enforce designations. • Public land within areas designated open to motorized vehicle use would generally remain available for such use subject to existing laws and regulations. The designated limited use areas primarily restrict motorized use to existing or designated roads or ways and may include other limitations as needed.	The OHV Limited designation would limit all OHV use to the same manner and degree occurring at the time of the designation in the RMP. The "OHV Limited Area" designation would prohibit any new surface disturbance, such as cross-country travel, unless subsequently authorized through another implementation-level decision (Map 2-38). Specific route designations would be made in an implementation-level travel and transportation management planning process following the completion of the RMP. Until route designation occurs, areas limited to designated routes would be managed as OHV limited. Map 2-38 reflects the best GIS data available at the time of this publication; these data were compiled using ESRI ArcGIS software. A more thorough review of the data would be performed as part of the CTTMP, which may include additional on-the-ground data collection and verification.	The OHV Limited designation would limit all OHV use to the same manner and degree occurring at the time of the designation in the RMP. The "OHV Limited Area" designation would prohibit any new surface disturbance, such as cross-country travel, unless subsequently authorized through another implementation-level decision (Map 2-39). Specific route designations would be made in an implementation-level travel and transportation management planning process following the completion of the RMP. Until route designation occurs, areas limited to designated route would be managed as OHV limited. Map 2-39 reflects the best GIS data available at the time of this publication; these data were compiled using ArcGIS. A more thorough review of the data would be performed as part of the CTTMP, which may include additional on-the-ground data collection and verification.	The OHV Limited designation would limit all OHV use to the same manner and degree occurring at the time of the designation in the RMP. The "OHV Limited Area" designation would prohibit any new surface disturbance, such as cross-country travel, unless subsequently authorized through another implementation-level decision (Map 2-40). Specific route designations would be made in an implementation-level travel and transportation management planning process following the completion of the RMP. Until route designation occurs, areas limited to designated route would be managed as OHV limited. Map 2-40 reflects the best GIS data available at the time of this publication; these data were compiled using ArcGIS. A more thorough review of the data would be performed as part of the CTTMP, which may include additional on-the-ground data collection and verification.	The OHV Limited designation would limit all OHV use to the same manner and degree occurring at the time of the designation in the RMP. The "OHV Limited Area" designation would prohibit any new surface disturbance, such as cross-country travel, unless subsequently authorized through another implementation-level decision (Map 2-41). Specific route designations would be made in an implementation-level travel and transportation management planning process following the completion of the RMP. Until route designation occurs, areas limited to designated route would be managed as OHV limited. Map 2-41 reflects the best GIS data available at the time of this publication; these data were compiled using ArcGIS. A more thorough review of the data would be performed as part of the CTTMP, which may include additional on-the-ground data collection and verification.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Public land within areas designated closed to motorized vehicle use would be closed year-long to all forms of motorized vehicle use except that in conjunction with BLM-authorized activities. A total of 55,966 acres would be designated closed to OHV use. The existing OHV closure for the Laguna Plata area would continue, the Pope's Well area would be closed to OHV use, and vehicles would be limited to designated routes in the Maroon Cliffs, Potash Bull Wheel, Poco Site, and Bear Grass Draw areas. Map 2-37 in Appendix A.	The following areas would be closed to motorized vehicle use (52,028 acres) (Map 2-38): • LWCs • Riparian (Pecos, Black, Delaware) • QP-A habitat area • Bilbrey habitat area • Mescalero habitat area • San Simon habitat area • Pearl habitat area • Skeen habitat area • Paduca habitat area • Southpaw habitat area • QP-C habitat area • Laguna Plata • Gypsum wild-buckwheat habitat • Black River Management Area • Pope's Well • Devil's Den WSA • Lonesome Ridge WSA • McKittrick Canyon WSA • Mudgetts WSA • Boot Hill routes	The following areas would be closed to motorized vehicle use (41,936 acres) (Map 2-39): • LWCs • Riparian (Pecos, Black, Delaware) • QP-A habitat area • Bilbrey habitat area • Mescalero Sands habitat area • San Simon habitat area • Paduca habitat area • Laguna Plata • Gypsum wild-buckwheat habitat • Black River Recreation Area • Pope's Well • Devil's Den WSA • Lonesome Ridge WSA • McKittrick Canyon WSA • Mudgetts WSA • Boot Hill routes	The following areas would be closed to motorized vehicle use (38,738 acres) (Map 2-40): • LWCs • Riparian (Black, Delaware) • QP-A habitat area • Bilbrey habitat area • Mescalero Sands A habitat area • San Simon habitat area • Paduca habitat area • Black River Recreation Area • Pope's Well • Devil's Den WSA • Lonesome Ridge WSA • McKittrick Canyon WSA • Mudgetts WSA • Boot Hill routes • Gypsum wild-buckwheat habitat	Same as Alternative C (Map 2-41).
No similar action.	The following specified routes in the planning area would be designated as follows: • Headwaters road (would be pedestrian-only designation) • Black River Road (would be closed and reclaimed) • Black River Management Area (would be closed and reclaimed to pedestrian-only trail) • Black River Road 2 (would be administrative use only) • Black River Road 3 (would be pedestrian only) • Seven Rivers Hills (would be administrative only) • Boot Hill (would be closed and reclaimed) • Railroad on Delaware Crossing (would be pedestrian and equestrian only) • Delaware roads (would be administrative use only) • Delaware 2 (would be closed and reclaimed) • Delaware 3 (would be administrative use only) • Lonesome Ridge (would be closed and reclaimed) • Mudgetts (would be closed and reclaimed)	Same as Alternative A.	Same as Alternative A.	No specified routes in the planning area are designated for closure or other type use.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Approximately 2,035,307 acres would be managed as OHV limited (Map 2-37).	Approximately 2,039,299 acres would be managed as OHV limited, including the following areas (Map 2-38): • Square Lake South Boundary • Hackberry Dunes SRMA (smaller boundary)	Approximately 2,049,391 acres would be managed as OHV limited, including (Map 2-39): • Square Lake South Boundary • Alkali Lake (smaller boundary) • West Well Dunes • Jal Dunes • Hackberry Dunes (larger boundary)	Approximately 2,052,582 acres would be managed as OHV limited including the following areas (Map 2-39): • Square Lake South Boundary • Square Lake Dunes • West Well Dunes • Jal Dunes • Hackberry Dunes (larger boundary)	Approximately 2,052,584 acres would be managed as OHV limited, including the following areas (Map 2-39): • Square Lake South Boundary • Square Lake Dunes • Alkali Lake ERMA • West Well Dunes • Jal Dunes • Jal Dunes (larger boundary) • Hackberry SRMA (entire SRMA boundary)
There would be no exceptions that allow for cross-country travel for game retrieval on BLM-administered land that has a limited or closed designation. This policy is consistent with all the national forests in the state of New Mexico. Public land users who engage in hunting activity on public land managed by the BLM should consider this cross-country restriction before doing so.	Same as the No Action Alternative.	Same as the No Action Alternative.	Off-route OHV travel in areas allocated as limited to designated routes would be allowed for big game retrieval within 300 feet of a designated route, primitive road, or trail.	Same as Alternative C.
A comprehensive transportation system management plan would be developed for each county in the planning area to establish functional classification and maintenance responsibilities for needed roads, and to identify unnecessary roads that would be closed and rehabilitated.	Same as the No Action Alternative, but would be planning area wide, not by county, and would be done incrementally.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Access management plans would be prepared to determine the best available method for providing access to public lands within specific tracts.	A travel and transportation management plan would be developed subsequent to the ROD for the RMP.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

2.24 RECREATION AND VISITOR SERVICES

2.24.1 Goals

1. The recreation program would produce a diversity of quality recreational opportunities that add to the recreation participant’s quality of life while contributing to local economies.

2.24.2 Objectives

Increase awareness, understanding, and a sense of stewardship in recreational activity participants so their conduct safeguards cultural and natural resources.
Ensure that visitors are not exposed to unhealthy or unsafe human-created conditions.
Achieve a minimum level of conflict between recreation participants to 1) allow other resources/programs to achieve their RMP objectives; 2) curb illegal trespass and property damage; and 3) maintain a diversity of recreation activity participation; Foster a sense of awareness and stewardship in recreational participants and local community partners to maintain recreation values in SRMAs, ERMAs, developed recreation sites, and community growth areas (BLM lands adjacent to, between, and surrounding communities). Safeguard cultural and natural resources.

2.24.3 Management Common to All Alternatives

1. All activities would adhere to BLM New Mexico Supplementary Rules and New Mexico’s OHV Safety Rules. For proposed actions regarding OHV use, OHVs would be defined by the regulations in 43 CFR § 8340.0–5 Definitions.
2. The use of certified weed-free hay would be required in all SRMAs, ERMAs, and throughout the planning area.
3. In conformance with 43 CFR 8365.2-5(a), "on developed recreational sites, unless otherwise authorized, no person shall: (a) discharge or use firearms, other weapons or fireworks."

2.24.4 Management Common to All Action Alternatives (actions that apply to Alternatives A, B, C, and D only)

1. Camping would be prohibited within 900 feet of any natural or human-made water source, excluding the Pecos River.
2. No bolted routes, permanent anchors, or fixed hardware associated with rock climbing activities would be allowed without written authorization from the CFO.

Note: The objectives and recreation setting characteristics for recreation management areas can be found in Appendix M.

Table 2-16. Alternatives for Recreation and Visitor Services

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
A Cave Resources SRMA covering 7,887 acres would be designated. Note: In the 1988 Carlsbad RMP, the SRMA was calculated at 5,990 acres, but current GIS lists it as 7,887 acres.	No similar action. See Cave Resources ACEC.	No similar action. See Cave Resources ACEC.	No similar action. See Cave Resources ACEC.	No similar action. See Cave Resources ACEC.
SRMAs and ERMAs				
The following areas would be managed as SRMAs (69,469 acres) (Map 2-42): • Caves Resources SRMA (8,626 acres) • Pecos River Corridor SRMA (6,008 acres) • Hackberry Lake OHV Area (53,560 acres) • Black River SRMA (1,275 acres) Specific outcome-focused objectives, proposed recreation setting characteristics (RSCs), and the proposed management framework can be found in Appendix M.	The following areas would be designated and managed as SRMAs (49,991 acres) (Map 2-43): • Black River (includes Cottonwood Day Use Area) (1,275 acres) • Hackberry Lake–same boundaries as the No Action Alternative minus habitat area boundary (36,889 acres) • Conoco Lake (7 acres) • La Cueva Trails (1,565 acres) • Alkali Lake (318 acres) • Pecos River Corridor (9,936 acres) Specific outcome-focused objectives, proposed recreation setting characteristics (RSCs), and the proposed management framework can be found in Appendix M. Note: Information regarding proposed management for each individual SRMA is stated below.	Same as Alternative A.	The following areas would be designated and managed as SRMAs (49,669 acres) (Map 2-45): • Black River (includes Cottonwood Day Use Area) (1,275 acres) • Hackberry Lake – same as the No Action Alternative minus habitat area boundary (36,889acres) • Conoco Lake (7 acres) • La Cueva Trails (1,565 acres) • Pecos River Corridor (9,935 acres) Specific outcome-focused objectives, proposed recreation setting characteristics (RSCs), and the proposed management framework can be found in Appendix M.	Same as Alternative C (Map 2-46).
There would be no ERMAs designated under this alternative.	The following area would be designated as an ERMA. ERMA objectives and the proposed management framework can be found in Appendix M (2,975 acres): • Square Lake South (2,975 acres)	The following areas would be designated as ERMAs. ERMA objectives and the proposed management framework can be found in Appendix M (26,564 acres): • Hay Hollow Equestrian Trail (12,913 acres) • Square Lake South (2,975 acres) • Pecos River Equestrian Trail (10,052 acres) • West Well Dunes (624 acres)	The following areas would be designated as ERMAs. ERMA objectives and the proposed management framework can be found in Appendix M (17,302 acres): • Square Lake (5,285 acres) • Pecos River Equestrian Trail (10,052 acres) • West Well Dunes (624 acres) • Alkali Lake (1,341 acres)	The following areas would be designated as ERMAs. ERMA objectives and the proposed management framework can be found in Appendix M (9,456 acres): • Pecos River Equestrian Trail (8,832 acres) • West Well Dunes (624 acres)

2.24.4.1 Alkali Lake

Table 2-17. Alternatives for Alkali Lake

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Alkali Lake would be managed as an OHV area (944 acres). It would be managed to ensure that other land and resource uses would not significantly interfere with organized recreational OHV use. • Apply special oil and gas stipulations to protect approved OHV trails and camping areas to all development authorizations within the area • **Leasables:** Open with moderate constraints • **Salables:** Open • **Locatables:** Open • **Renewables:** Exclusion area for solar; avoidance area for wind • **VRM:** Class IV • **Travel:** OHV limited • **ROWs:** Open • **Grazing:** Open • Require Special Recreation Permit authorizations for competitive or commercial motorcycle events • Manage for full fire suppression Notes: The boundary for this alternative includes Restore New Mexico areas, and does not include existing trails to the south.	Alkali Lake (318 acres) would be managed as an SRMA. • Apply NSO on trails • Manage the SRMA as open with major constraints for leasables, open to locatable development, and closed to salable development • **Renewables:** Excluded for solar and wind • **VRM:** Class III (318 acres) • **Travel:** OHV limited • Make the SRMA a ROW exclusion area on dunes and a ROW avoidance elsewhere • **ROWs:** Excluded • **Grazing:** Open • Manage for full fire suppression Note: The boundary for this alternative would be different than the No Action Alternative because it would exclude Restore New Mexico areas and include existing trails to the south.	Same as Alternative A.	Alkali Lake would be managed as an ERMA (1,341 acres) with the following prescriptions: • Open with moderate constraints for **leasables**, open to **locatable** development, and closed to **salable** development • **Renewables**: Excluded for solar and wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Excluded • Manage for full fire suppression Note: The ERMA would have the same boundary as Alternative A.	Alkali Lake would not be managed as an SRMA or ERMA, but would be managed with the following prescriptions: • **Leasables:** Open with standard terms • **Salables:** Open • **Locatables:** Open • **Renewables:** Open for wind and variance for solar • **VRM:** Class IV • **Travel:** OHV limited • **Grazing:** Open • **ROWs:** Open • Manage for full fire suppression

2.24.4.2 Black River including the Cottonwood Day Use Area

2.24.4.2.1 *Management Common to All Action Alternatives*

1. NSO or Closed to leasable and salable development; recommend for withdrawal from locatable development.
2. Manage as excluded from renewable development (geothermal, solar, wind).
3. Manage as VRM Class II.
4. Manage as closed to travel.
5. Manage as closed to grazing.
6. Manage as excluded to ROWs.
7. The SRMA would be closed to all mineral development activities.

2.24.4.3 Conoco Lake

2.24.4.3.1 *Management Common to All Action Alternatives*

1. The SRMA would be managed as open with major constraints for leasable development, recommend for withdrawal from locatable development, and closed to salable development.
2. Manage renewables as excluded for wind and solar
3. Manage as VRM Class II.
4. The SRMA would be a ROW exclusion area.
5. Manage travel as closed.
6. The SRMA would be closed to grazing.

2.24.4.4 Hackberry Lake (formerly Hackberry Lake OHV Area)

2.24.4.4.1 *Management Common to All Action Alternatives*

1. Manage as open with moderate constraints for leasables and open with special terms and conditions for salable development.
2. Manage as open to locatable development.
3. Manage as an avoidance area for wind development and exclude from solar development.
4. Manage as VRM Class III.
5. Manage travel as OHV limited.
6. Manage as an avoidance area for ROWs.

2.24.4.4.2 *Dunes Recreation Management Zone of the Hackberry Lake SRMA*

Management Common to All Action Alternatives

1. The RMZ would be managed as VRM Class III.
2. There would be an NSO stipulation on active dunes and developed areas for future leases.
3. The SRMA would be managed as a ROW exclusion area on dunes and ROW avoidance area on trails.
4. The SRMA would be managed as open to grazing, except for 255 acres would be closed under Alternative C due to other resource restrictions.

2.24.4.4.3 *Trails Recreation Management Zone of the Hackberry Lake SRMA*

Management Common to All

1. The RMZ would be managed as VRM Class III.
2. Travel would be OHV limited. Routes would be expanded as needed to meet the recreation objectives of the area.

Table 2-18. Alternatives for Hackberry Lake SRMA (formerly Hackberry Lake OHV Area)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Hackberry Lake (53,60 acres) is currently managed as an SRMA with the following prescription: • **Grazing:** Open	Hackberry Lake (36,889 acres) would be managed as an SRMA with the following prescription: • **Grazing:** Open	Same as Alternative A except 255 acres would be closed to livestock grazing due to other resource concerns.	Same as Alternative A.	Same as Alternative A.

2.24.4.5 La Cueva

2.24.4.5.1 *Management Common to All Action Alternatives*

1. Manage as VRM Class III unless superseded by other resource decisions.
2. Manage as open to grazing.

Table 2-19. Alternatives for La Cueva SRMA

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
La Cueva is not currently designated as an SRMA. The area is managed with the following prescriptions: • **Leasables:** Open • **Salables:** Open (1,505 acres), closed (60 acres) • **Locatables**: Open (1,505 acres) except for the portion that overlaps with the Cave Resources ACEC (60 acres), which would be recommended for withdrawal • **Renewables**: Exclude for solar, avoid for wind • **ROWs**: Open (1,505 acres), closed (60 acres)	La Cueva Trails would be designated as an SRMA (1,564 acres) and would be managed with the following prescriptions: • **Leasables**: Open (1,525 acres), open with major constraints (40 acres) • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar (1,523 acres), exclude for solar (40 acres), open to wind (1,525 acres), excluded from wind (40 acres) • **ROWs**: Open (1,525 acres), closed (40 acres)	La Cueva Trails would be designated as an SRMA (1,564 acres) and would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Exclude for solar and wind • **ROWs**: Closed	La Cueva Trails would be designated as an SRMA (1,564 acres) and would be managed with the following prescriptions: • **Leasables**: Open (1,525 acres), open with major constraints (40 acres) • **Salables**: Closed • **Locatables**: Open (1,525 acres), recommended for withdrawal (40 acres) • **Renewables**: Variance for solar (1,525 acres), exclude from solar (40 acres, open to wind (1,525 acres), excluded from wind (40 acres) • **ROWs**: Open (1,525 acres), closed (40 acres)	La Cueva Trails would be designated as an SRMA (1,564 acres) and would be managed with the following prescriptions: • **Leasables**: Open (1,525 acres), closed (40 acres) • **Salables**: Closed • **Locatables**: Open (1,525 acres), recommended for withdrawal (40 acres) • **Renewables**: Variance for solar (1,525 acres), exclude from solar (40 acres, open to wind (1,525 acres), excluded from wind (40 acres) • **ROWs**: Open (1,525 acres), closed (40 acres

2.24.4.6 Pecos River Corridor

2.24.4.6.1 *Management Common to All Action Alternatives*

1. Do not remove livestock on the 120-acre Red Bluff Reservoir area.
2. Manage as open with major constraints for leasable development.
3. Recommend for withdrawal from locatable development.
4. Manage as closed to salable development.
5. Manage as VRM Class II.

Table 2-20. Alternatives for Pecos River Corridor SRMA

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Pecos River Corridor would be (is) managed as an SRMA (6,008 acres). The Pecos River Corridor SRMA would be a 0.5-mile-wide corridor on public land along the Pecos River. Management objectives would provide protection for scarce water-based recreation, provide public access, protect the natural values, and still allow for semi-primitive motorized recreation. Additional goals are to reduce soil erosion and vegetation destruction while still allowing leasable minerals and other resource development to occur in the area The SRMA would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Open (389 acres), closed (5,619 acres) • **Locatables**: Recommended for withdrawal (6,006 acres) • **Renewables**: Exclude from solar, avoidance for wind • **VRM**: Class II • **Travel**: OHV limited (5,497 acres), closed (122 acres for Red Bluff Reservoir) • **Grazing**: Open (5,497 acres), closed (122 acres) • **ROWs**: Open (5,428 acres), avoid (199 acres)	The Pecos River Corridor SRMA (9,936 acres) would be a 0.5-mile-wide corridor on public land along the Pecos River, and would be managed to provide recreation opportunities on public land parcels with an emphasis on natural and scenic qualities. The objective for the SRMA would be to manage the Pecos River SRMA for boating, hunting, fishing, and wildlife-viewing experiences. The SRMA would be managed with the following prescriptions: • **Leasables**: Open with major constraints (9,118 acres), closed (818 acres) • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar (1,110 acres), exclude from solar (8,026 acres), excluded from wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Open (43 acres), closed (9,094 acres) • **ROWs**: Excluded except where designated ROW utility corridors cross the Pecos River.	The Pecos River Corridor would be managed as an ERMA and would be a 0.5-mile-wide corridor on public land along the Pecos River with the following prescriptions: • **Leasables**: Open with major constraints (9,759 acres), closed (176 acres) • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar (1,061 acres), exclude from solar (8,074 acres), excluded from wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Open (5,175 acres), closed (3,960 acres acres) • **ROWs**: Excluded except where designated ROW utility corridors cross the Pecos River.	The Pecos River Corridor would be managed as an ERMA and would be a 0.5-mile-wide corridor on public land along the Pecos River with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar (1,061 acres), exclude from solar (8,074 acres), excluded from wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Open (8,616 acres), closed (520 acres acres) • **ROWs**: Excluded except where designated ROW utility corridors cross the Pecos River.	The Pecos River Corridor would not be managed as an SRMA or ERMA, but would be managed for dispersed use allowing for recreational use in accordance with other resource management objectives. It would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar (1,349 acres), exclude from solar (7,787 acres), excluded from wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Open (8,838 acres), closed (298 acres acres) • **ROWs**: Excluded except where designated ROW utility corridors cross the Pecos River.

Table 2-21. Alternatives for West Wells Dune ERMA (624 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
West Wells Dune (624 acres) would not be managed as an ERMA but would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded for solar; open for wind • **VRM**: Class IV • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open	West Well Dunes (624 acres) would not be managed as an ERMA. It would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Variance for solar, avoid for wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Avoid	West Well Dunes (624 acres) would be managed as an ERMA with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Open • **Renewables**: Excluded for solar and wind • **VRM**: Class III • **Travel:** OHV limited on trails/dunes. Trails would be expanded on case-by-case basis. • **Grazing**: Open • **ROWs**: Exclude	Same as Alternative B except leasable development would be managed as open with moderate constraints and recommended for withdrawal from locatable development.	Same as Alternative C.

Table 2-22. Alternatives for Pecos River Equestrian Trail ERMA

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Pecos River that is proposed as an ERMA under Alternatives A–D would not be managed as an ERMA (11,207 acres). Dispersed use would be allowed but there would be no development of equestrian trails in the area. It would be managed with the following prescriptions: • **Leasables**: Open with standard terms (8,827 acres), open with moderate constraints (1,216 acres), open with major constraints (999 acres), closed (164 acres) • **Locatables**: Open (9,102 acres), recommended for withdrawal (2,104 acres) • **Salables**: Open (9,102 acres), closed (2,105 acres) • **Renewables**: Excluded for solar, open to wind (9,596 acres), avoidance area for wind (1,427 acres) • **VRM**: Class II (1,940 acres), Class IV (9,268 acres) • **Grazing**: Open • **Travel**: OHV limited (10,124 acres), closed (897 acres) • **ROWs**: Open (10,023 acres), avoid (999 acres)	The Pecos River Equestrian Trail (11,022 acres) would be managed as an ERMA. The objective would be to manage the Pecos River Equestrian Trail with a primary focus on equestrian experiences and a secondary focus on other non-motorized experiences while protecting cultural resources, soil resources, and riparian habitat. The ERMA would be managed with the following prescriptions: • **Leasables**: Open with standard terms (8,403 acres), open with major constraints (2,453 acres), closed (165 acres) • **Salables**: Open to salable development (7,138 acres), open with special terms and conditions (1,216 acres), closed (2,668 acres) • **Locatables**: Open (8,354 acres), recommended for withdrawal (2,668 acres) • **Renewables**: Open for geothermal (120 acres), closed to geothermal (65 acres), variance for solar (8,403 acres), excluded from solar (2,619 acres), open to wind (7,139 acres), avoid for wind (1,214 acres), excluded to wind (2,668 acres) • **VRM**: Class II (3,954 acres), Class IV (7,253 acres) • **Grazing:** Open (9,512 acres), closed (1,510 acres) • **Travel**: OHV limited • **Grazing**: Open (9,512 acres), closed (1,510 acres) • **ROWs**: Open (7,139 acres), avoid (1,214 acres), excluded (2,688 acres)	The Pecos River Equestrian Trail (10,052 acres) would be managed as an ERMA. The objective would be to manage the Pecos River Equestrian Trail with a primary focus on equestrian experiences and a secondary focus on other non-motorized experiences while protecting cultural resources, soil resources, and riparian habitat. The ERMA would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints (7,881 acres), open with major constraints (2,008 acres), closed (164 acres) • **Salable**: Open (6,734 acres), open with special terms and conditions (1,226 acres), closed (2,093 acres) • **Locatables**: Open (7,960 acres), recommended for withdrawal (2,093 acres) • **Renewables**: Closed to geothermal (104 acres), variance for solar (2,045 acres), excluded from solar (8,011 acres), avoid for wind (7,959 acres), excluded to wind (2,093 acres) • **VRM**: Class II • **Grazing**: Open (9,992 acres), closed (64 acres) • **Travel**: OHV limited • **ROWs**: Avoidance area (7,959 acres), excluded (2,093 acres)	The Pecos River Equestrian Trail (10,052 acres) would be managed as an ERMA. The objective would be to manage the Pecos River Equestrian Trail with a primary focus on equestrian experiences and a secondary focus on other non-motorized experiences while protecting cultural resources, soil resources, and riparian habitat. The ERMA would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints (7,959 acres), open with major constraints (1,930 acres), closed (164 acres) • **Salable**: Open (7,960 acres), closed (2,093 acres) • **Locatables**: Open (7,960 acres), recommended for withdrawal (2,093 acres) • **Renewables**: Closed to geothermal (104 acres), variance for solar (2,045 acres), excluded from solar (8,011 acres), avoid for wind (7,959 acres), excluded to wind (2,093 acres) • **VRM**: Class II • **Grazing**: Open • **Travel**: OHV limited • **ROWs**: Avoidance area (7,959 acres), excluded (2,093 acres)	The Pecos River Equestrian Trail ERMA (8,832 acres) would designate/construct a new trail in combination with using existing trails, with no motorized or mechanized use allowed on single-track portions of the equestrian trail. The ERMA would be managed as dispersed use, allowing for recreational use in accordance with other resource management objectives. • **Leasables**: Open with moderate constraints (8.023 acres), open with major constraints (645 acres), closed (164 acres) • **Salables**: Open (8,023 acres), closed (808 acres) • **Locatables**: Open (8,023 acres), recommended for withdrawal (808 acres) • **Renewables**: Open to geothermal (120 acres), closed to geothermal (66 acres), variance for solar (2,045 acres), excluded from solar (8,835 acres), avoid for wind (8,022 acres), excluded to wind (808 acres) • **VRM**: Class II (981 acres), Class III (7,807 acres), Class IV (230 acres) • **Grazing**: Open • **Travel**: OHV limited • **ROWs**: Open (8,022 acres), excluded (809 acres)

Table 2-23. Alternatives for Hay Hollow Equestrian Trail ERMA (12,911 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Hay Hollow (12,913 acres) would not be managed as an ERMA. Dispersed use would be allowed but there would be no development of trails. The area would be managed with the following prescriptions: • **Leasables**: Open with standard terms • **Salables**: Open • **Locatables**: Open • **Renewables**: Exclusion area for solar, avoidance area for wind • **ROWs**: Open • **Travel**: Open • **VRM**: Class III (7,310 acres), Class IV (5,603 acres) • **Grazing**: Open • **ROWs**: Open	The Hay Hollow Equestrian area (12,913 acres) would not be managed as an ERMA but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (6,478 acres), open with major constraints (1,024 acres), closed (5,411 acres) • **Salables**: Open (6,478 acres), closed (6,435 acres) • **Locatables**: Open (7,502 acres), recommended for withdrawal 5,411 acres) • **Renewables**: Variance for solar (6,469 acres), excluded to solar (6,442 acres), open to wind (6,478 acres), excluded to wind (6,435 acres) • **Travel**: OHV limited • **VRM**: Class III (9,696 acres), Class IV (3,217 acres) • **Grazing**: Closed • **ROWs**: Open (6,478 acres), excluded (6,435 acres) Note: There are underlying prescriptions (wildlife corridors and sensitive soils) in this ERMA that create the closed to development prescriptions.	The Hay Hollow Equestrian Trail (12,913 acres) would be managed as an ERMA, with potential trail and facility development. The objective would be to manage the trail with a primary focus on equestrian experiences, and a secondary focus on other non-motorized experiences while protecting cultural resources, soil resources, wildlife, and riparian habitat. The ERMA would be managed with the following prescriptions: • **Leasables**: Open (4,584 acres), open with moderate constraints (1,033 acre), open with major constraints (7,296 acres) • **Salables**: Open (5,617 acres), closed (7,296 acres) • **Locatables**: Open (5,617 acres), recommended for withdrawal (7,296 acres) • **Renewables**: Variance for solar (5,608 acres), excluded to solar (7,302 acres), open to wind (5,617 acres), excluded to wind (7,296 acres) • **VRM**: Class II (5,276 acres), Class III (7,636 acres) • **Travel**: OHV limited • **Grazing**: Closed • **ROWs**: Open (7,296 acres), excluded (7,296 acres) Note: There are underlying prescriptions (wildlife corridors and sensitive soils) in this ERMA that create the closed to development prescriptions.	Hay Hollow (12,913 acres) would not be managed as an ERMA but would be managed with the following prescriptions: • **Leasables**: Open (6,471 acres), open with moderate constraints (6,442 acres) • **Salables** Open (6,471 acres), open with special terms and conditions (6,442 acres) • **Locatables**: Open • **Renewables**: Variance for solar (5,609 acres), excluded from solar (7,302 acres), open to wind (6,470 acres), avoid for wind (5,035 acres), excluded to wind (1,406 acres) • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open (6,471 acres), avoid (6,441 acres)	Same as the No Action Alternative except: • **Renewables**: Variance for solar and open to wind development • **VRM**: Class III (9,696 acres), Class IV (3,217 acres)

Table 2-24. Alternatives for Square Lake ERMA

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Square Lake (5,285 acres) would not be managed as an ERMA. The area would be managed with the following prescriptions: • **Leasables:** Open with moderate constraints (2,979 acres), closed (2,306 acres) • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded from solar, open for wind • **VRM**: Class IV • **Travel**: OHV limited (2,982 acres), closed (2,304 acres) • **Grazing**: Open • **ROWs**: Open • Restrict noise from generators to LPC dB timing restrictions in or near the ERMA (BLM 2008)	Square Lake South (2,975 acres) would be managed as an ERMA with an objective to provide for open OHV play experiences on open dunes while restricting travel to designated routes between dunes. The Square Lake South ERMA would be managed with the following prescriptions: • **Leasables**: Open with moderate constraints • **Salables:** Closed • **Locatables**: Open • **Renewables**: Excluded to solar and wind) • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Avoid	Same as Alternative A except leasable development would be managed as closed and 785 acres would be recommended for withdrawal.	The ERMA would be called the Square Lake ERMA and be managed with a larger boundary (5,285 acres) with the following prescriptions: • **Leasables**: Open with moderate constraints (2,979 acres), open with major constraints (2,306 acres) • **Salables:** Closed • **Locatables**: Open • **Renewables**: Excluded to solar, open to wind (2,306 acres), excluded to wind (2,306 acres) • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Avoid (2,973 acres), excluded (2,306 acres)	Same as Alternative C except the entire area would be managed as open with moderate constraints for leasable development, would be entirely excluded from wind development, and would be managed as VRM Class IV.

2.25 LAND USE AUTHORIZATIONS

2.25.1 Goals

1. Manage public lands to meet transportation and ROW needs.
2. Manage suitable public lands for developing renewable energy (e.g., wind, solar, and geothermal).

2.25.2 Objectives

1. Consider multiple use objectives to make public lands available to meet the needs of major ROW customers (e.g., intrastate pipeline or transmission) while acknowledging and mitigating potential conflicts with natural resources.
2. Consider multiple use objectives to make public lands available to meet the needs of smaller ROW customers (e.g., roads, power lines, and pipelines for oil and gas fields) while acknowledging and mitigating potential conflicts with natural resources.
3. Maintain and acquire road easements for public access to meet resource management needs.

2.25.3 Management Common to All Alternatives

1. Restrictions for the Gnome Site (see Chapter 3 for more information on the Gnome Site):
   a. Surface (0–20 feet below ground surface): No drilling, excavating, or other activities at any depth within 40 lateral feet of the concrete cap that protects the emplacement shaft. Excavation (0–20 feet below ground surface) may be allowed at the site with BLM approval, but excavations should avoid the existing groundwater monitoring wells and features associated with the site (existing concrete structures, monuments, the salt muck pile, and areas with buried debris).
2. Subsurface (>20 feet below ground surface): No drilling, excavating, or other activities that would disturb materials deeper than 20 feet below the surface are permitted in Section 34, Township 23S, Range 30E within the planning area.

   Please note that areas proposed for avoidance of or exclusion from rights-of-way (ROW) authorizations under the action alternatives would be subject to valid and existing lease rights, meaning that operators of any current oil and gas leases may be granted ROWs, even if the ROW falls within an area that would be avoided or excluded under one of these alternatives. In addition, the ROW avoidance and exclusion in areas with existing leases would apply to any ROWs issued, whether it was issued under FLPMA or the Mineral Leasing Act (MLA). The BLM would allow for the ROW infrastructure necessary to meet the valid existing rights.

   Note that all ROW corridors shown on Map 2.48 and Maps 2.48-2.52 would be open for ROW. Any other designations (e.g. avoidance or exclusion) would be superseded by this decision.

Table 2-25. Alternatives for Land Use Authorizations

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
For projects in the planning area, public land would be open to the consideration of granting ROWs except where otherwise noted (Map 2-48). • **Open:** 2,051,927 acres • **Avoid:** 30,965 acres • **Exclude:** 7,056 acres The Draft RMP/EIS designates avoidance areas in 27 SMAs including Laguna Plata, Maroon Cliffs, Potash Bull Wheel, Pope's Well, and the Caves SMA. Approximately 3,780 acres outside SMAs were designated as avoidance areas.	All projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level (Map 2-49). • **Open:** 798,544 acres • **Avoid:** 629,149 acres • **Exclude:** 662,038 acres	All projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level (Map 2-50). • **Open:** 757,380 • **Avoid:** 413,654 acres • **Exclude:** 918,701 acres	All projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level (Map 2-51). • **Open:** 1,610,692 acres • **Avoid:** 313,619 acres • **Exclude:** 165,378 acres	All projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level (Map 2-52). • **Open:** 1,749,782 • **Avoid:** 270,360 acres • **Exclude:** 69,540 acres
Five ROW corridors have been designated as the BLM's preferred locations for major new utility and transportation facility alignments through the planning area. The 1-mile-wide designated corridors are 479 miles long and cover approximately 184,201 acres. In order to comply with Section 368 of the Energy Policy Act of 2005, the Pecos District would designate utility corridors for major projects such as interstate electric transmission lines, pipelines, and communications lines for interstate use. New projects of these types would be sited in the utility corridors	Pipeline and underground utility ROW corridors would be designated to provide access to infrastructure for local and interstate use as shown on Map 2-47 and Map 2-31 of Appendix A. The designated corridors total 479 miles and cover approximately 184,201 acres.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
shown on Map 2-47 in Appendix A. The corridors depicted on Map 2-47 would be no more than 3,500 feet wide.				
The following would be exclusion areas for ROWs for pipeline, road, site, power line, and power line and wind development: • WSAs • Lands acquired as habitat for special status species would be added to the ROW exclusion area for major projects • All surface-disturbing activities would be prohibited in the Gnome withdrawal section • LPC HAs Total acreage excluded: 7,086 Note to reader: Acreage must be corrected in GIS; WSAs should be included. Additionally, although there are overlapping exclusion and avoidance areas over ROW corridors that are designated as preferred future locations of ROWs, ROWs will continue to be accommodated for all alternatives. This issue should be addressed between draft and final plan.	The following would be exclusion areas for ROWs for pipeline, road, site (see Glossary for definition), and power line and wind development: • WSAs • LWCs • Eligible WSRs • National and scenic historic trails (as delineated by SRMA, ACEC, or VRM areas) • VRM Class I areas • Withdrawn lands for resources (springs, riparian areas, caves, etc.) • Gnome withdrawal section • Wetlands and riparian areas • Designated and proposed critical habitat for federally threatened and endangered species • Habitat for federal listed/proposed threatened and endangered species for which critical habitat has not been designated • Cryptobiotic (microbiotic) crusts (three mapping units used for minerals allocations) • Select ACECs – see Special Designations • LPC HAs Total acreage excluded: 662,038	The following would be exclusion areas for ROWs for pipeline, road, site, and power line and wind development: • WSAs • LWCs • Eligible WSRs • National and scenic historic trails (as delineated by SRMA, ACEC, or VRM areas) • VRM Class I areas • Withdrawn lands for resources (springs, riparian areas, caves, etc.) • Gnome withdrawal section • Archaeological districts • TCPs • Wetlands and riparian areas • Designated and proposed critical habitat for federally threatened and endangered species • Habitat for federal listed/proposed threatened and endangered species for which critical habitat has not been designated • Federal candidate species habitat (includes rare plants) • Cryptobiotic (microbiotic) crusts (three mapping units used for minerals allocations) • Select ACECs – see Special Designations • LPC HAs Total acreage excluded: 918,701	The following would be exclusion areas for ROWs for pipeline, road, site, and power line and wind development: • WSAs • Eligible WSRs • VRM Class I areas • Gnome withdrawal section • Cryptobiotic (microbiotic) crusts (three mapping units used for minerals allocations) The following would be exclusion areas for pipelines and power lines: • LWCs The following would be an exclusion area for roads: • Wetlands and riparian areas The following would be exclusion areas for sites: • National and scenic historic trails (as delineated by SRMA, ACEC, or VRM areas) • Wetlands and riparian areas • Select ACECs – see Special Designations • LPC HAs Total acreage excluded: 165,378	The following would be exclusion areas for ROWs for pipeline, road, site, and power line and wind development: • WSAs • Eligible WSRs • VRM Class I areas • Gnome withdrawal section Select ACECs – see Special Designations Total acreage excluded: 69,540
The following would be avoidance areas for ROWs for pipeline, road, site, and power line development: • Approximately 27,845 acres would be avoidance areas in 27 SMAs, and 3,120 acres outside SMAs for a total of 30,965 acres, including Seven Rivers Hills HMA, Cave Resources SMA, South Texas Hill Canyon, Dark Canyon SMA, Lonesome Ridge ACEC, Springs Riparian Habitat SMA, Yeso Hills RNA, Bluntnose Shiner HMA, Little McKittrick Draw RNA, and Maroon Cliffs and Laguna Plata Cultural Resources Management Areas (CRMA). Total acreage avoided: 30,965 acres	The following would be avoidance areas for ROWs for pipeline, road, site, and power line development: • VRM Class II areas • Archaeological districts • TCPs • BLM special status species' habitats • Gypsum soils, open sand dunes (per sensitive soils definition) • Floodplains Total acreage avoided: 629,149	The following would be avoidance areas for ROWs for pipeline, road, site, and power line development: • VRM Class II areas • BLM special status species' habitats • Gypsum soils, open sand dunes (per sensitive soils definition) • Carlsbad Wellhead Protection Areas (Sheepdraw Field) specific to oil and gas development • Floodplains Total acreage avoided: 413,654	The following would be avoidance areas for ROWs for pipeline, road, site, and power line development: • VRM Class II areas • Archaeological districts • BLM special status species' habitats • TCPs • Carlsbad Wellhead Protection Areas (Sheepdraw Field) specific to oil and gas development • Floodplains • Gypsum soils, open sand dunes (per sensitive soils definition) • Cryptobiotic (microbiotic) crusts (three mapping units used for minerals allocations) • Wetlands and riparian areas • All inventoried LWCs • National and scenic historic trails (as delineated by SRMA, ACEC, or VRM areas) The following would be avoidance areas for sites: • All inventoried LWCs • Wetlands and riparian areas Total acreage avoided: 313,619	The following would be avoidance areas for ROWs for pipeline, road, site, and power line development: • LWCs • VRM Class II areas • National and scenic historic trails (as delineated by SRMA, ACEC, or VRM areas) • Archaeological districts • TCPs • Wetlands and riparian areas • Carlsbad Wellhead Protection Areas (Sheepdraw Field) specific to oil and gas development • Floodplains • BLM special status species' habitats • Cryptobiotic (microbiotic) crusts (three mapping units used for minerals allocations) • Gypsum soils, open sand dunes (per sensitive soils definition) Total acreage avoided: 270,360

2.26 LAND TENURE

2.26.1 Goals

1. Manage the acquisition, disposal, withdrawal, and use of public lands to meet the needs of the public and to preserve important resource values.

2.26.2 Objectives

1. Allow for more efficient and economic management of public lands and resources and facilitate acquisition of lands with high public values and uses.
2. Conduct withdrawal review of existing withdrawals. The objective of withdrawal review is to minimize the amount of land withdrawn from mining, mineral leasing, or other single-use designations or classifications. This review can lead to revoking or modifying the withdrawal on part of all of the withdrawn lands or may result in no change of status. Where applicable, the existing withdrawals would be replaced with other types of authorizations that allow for other compatible uses. The review of other agency withdrawals would continue.
3. Conduct environmental site assessments prior to acquisition or disposal (see CERCLA section 120(h)) to comply with the Community Environmental Response Facilitation Act.
4. Develop and maintain a land ownership pattern that would provide better access for managing and protecting public lands.
5. Maximize appropriate disposal actions to help solve problems related to intermixed land ownership patterns.
6. Accommodate community growth and development when it is determined to be in compliance with other RMP goals and objectives.
7. Maintain availability of public lands to meet the habitation, cultivation, mineral development, trade, recreation, and manufacturing needs of the public.
8. Identify lands for withdrawal to meet federal land use needs.

2.26.3 Management Common to All Alternatives

1. Public lands not specifically identified for disposal in this plan would be retained in federal ownership and managed for multiple use.
2. New withdrawal initiatives would be processed on a case-by-case basis. Springs and seeps would be avoided by 984 feet unless closed.
3. Public lands would be made available for exchange to accommodate the National Park Service objective to acquire a private inholding with Carlsbad Caverns National Park. Public lands identified for disposal from federal ownership must be included in this approved RMP. All lands identified for disposal must meet the criteria set forth in Sections 203, 206, or 209, as applicable, of FLPMA. Disposal of public lands would be accomplished by sale, exchange, state indemnity selection, or title transfer pursuant to any applicable federal authority. Land ownership patterns may be adjusted consistent with the Memorandum of Understanding dated October 1984 between the BLM and the New Mexico State Land Office. Transfers to other public agencies would be considered where increased management efficiency results. The criteria for public disposal, which are legislatively required and resource-oriented, would be considered in land reports and EAs prepared for specific proposals. Parcels of public land that meet the following criteria would be considered for sale, exchange, or title transfer: 1) lands are determined to be not needed for a federal project or resource management activities, 2) lands where retention is not in the national interest, or 3) lands where management by the BLM is not cost efficient. Existing R&PP authorizations for sanitary landfills would be terminated. Lands would be made available through FLPMA sale for the purpose of public sanitary landfills, if the criteria for land disposal are met. The federal government would generally retain all mineral rights and reservations for ditches and canals.

2.26.4 Management Common to All Action Alternatives (actions that apply to Alternatives A, B, C, and D only)

1. Pursue closing all BLM springs and seeps to salables and mineral disposal.
2. Pursue withdrawal for all BLM springs and seeps from locatables.

Table 2-26. Alternatives for Land Tenure

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
R&PP lease/sales would be allowed in retention zones to facilitate state exchanges to consolidate blocks of public land, which is consistent with the multiple use objectives, and if there is a compelling need. Public lands not specifically identified for disposal in the Draft RMP/EIS would be retained in federal ownership and managed for multiple use.	Lands for retention would be considered based on these characteristics: • Those lands specifically identified by the tribes as having special importance related to treaty and/or traditional uses/values • Endangered, threatened, proposed, and candidate species habitat • NRHP eligible and listed properties. • Wildlife tracts for candidate or special status species • Lands acquired under Land and Water Conservation Fund	Same as Alternative A. but also include the following areas: • Along VRM Class I and II corridors • Riparian areas • M-13 Hope Grasslands	Same as Alternative A.	Same as Alternative A.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Through sales and exchanges, approximately 218,318 acres would be disposed of throughout the planning area. This includes lands in the Loco Hills community area, the Waste Isolation Pilot Plant administered by the U.S. Department of Energy, and scattered tracts east of the Pecos River in Eddy County, in southwest Chaves County, and in Lea County. Approximately 4,000 acres east of Carlsbad have been designated for disposal for industrial development (Map 3-32).	Through sales, exchanges, or any other title transfer means, approximately 18,703 acres would be disposed of throughout the planning area (Map 2-63). • Criteria (18,499 acres) • Internal BLM (203 acres) Note: Criteria areas are lands that were reviewed by the BLM interdisciplinary team that fit BLM criteria for disposal.	Through sales, exchanges, or any other title transfer means, approximately 26,125 acres would be disposed of throughout the planning area (Map 2-64).	Through sales, exchanges, or any other title transfer means, approximately 31,536 acres would be disposed of throughout the planning area (Map 2-65).	Through sales, exchanges, or any other title transfer means, approximately 51,579 acres would be disposed of throughout the planning area (Map 2-66).
Land sales under the Federal Land Transaction Facilitation Act (FLTFA) would be carried out in accordance with provisions outlined in the act. (Law has come to the end of its term.)	If FLTFA is reauthorized, lands available for disposal would have to meet the FLTFA criteria for disposal.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
The BLM would consider acquisition of land in the planning area for special status species habitat when the opportunity arises from willing sellers. There would be a priority on exchanges with the New Mexico State Land Office within the planning area. Other lands may be acquired within retention zones if determined to contain resources important for special management programs. State land is proposed for acquisition in the Laguna Plata CRMA (1,280 acres) and Pecos River Canyons Complex ACEC (840 acres). Private land acquisition decisions for ACECs include Blue Springs (480 acres), Chosa Draw Caves Complex (480 acres), Pecos River/Canyons Complex (120 acres). The BLM would attempt to acquire 1,080 acres of private land and 2,120 acres of state land to protect important resource values and to meet objectives for SMAs designated through the RMP. Acquisitions would be acquired via exchange, purchase of land and easements, and donation if they: • Improve management of natural resources through consolidation of BLM, state, and other federal lands where agencies have compatible land management missions. • Secure property necessary to protect special status species, promote biological diversity, enhance wildlife habitat, provide access to public waters and public land, and preserve archaeological and historical resources. • Meet the criteria for acquisitions found in Appendix 5 of the 1997 Roswell RMP. • Approximately 1,280 acres of non-federal surface and mineral estate in the Laguna Plata CRMA are planned for possible acquisition. Easements would be acquired across non-federal land to provide access to the public land for recreational, special management, and other resource needs. Priority for acquisitions of easements would be placed on former county roads vacated by the county government, when those roads are important for the management of the public land.	Lands or interest in lands would be acquired via exchange, purchase, and donation if they: • Improve management of natural resources through consolidation of BLM, state, and other federal lands where agencies have compatible land management missions. • Secure property necessary to protect special status species, promote biological diversity, enhance wildlife habitat, provide access to public waters and public land, and preserve archaeological and historical resources. Acquisition priorities (not in priority order) would include the following: • Endangered, threatened, proposed, or candidate species habitat • BLM Type 2 Sensitive species habitat • Lands within special designations • Riparian areas • Lands containing known archaeological, paleontological, or historical values determined to be unique or of traditional or scientific importance • Lands that would provide public access to public lands, including but not limited to river access and areas of high recreation value • Lands that would help consolidate public land • Lands that would help improve livestock grazing management	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Applications for land use, such as R&PP lease, would be considered for approval on a case-by-case basis. R&PP lease/sales would be allowed in retention zones to facilitate state exchanges, to consolidate blocks of public land, which are consistent with the multiple use objectives, and if there is a compelling need. Landfills, hazardous waste disposal sites, and produced water disposal pits would not be authorized under ROWs or Recreation and Public Purposes Act leases.	R&PP lease/sales may be allowed in retention zones to give first consideration to meet public purpose–oriented community expansion needs. Disposal to facilitate state exchanges would be allowed in retention zones to consolidate blocks of public land, which are consistent with the multiple use objectives, and if there is a compelling need.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

2.27 SPECIAL DESIGNATIONS – AREAS OF CRITICAL ENVIRONMENTAL CONCERN

2.27.1 Goals

1. Manage to protect the important biological, cultural, scenic, and historic resources that meet the criteria for relevance and importance and require special management attention.

2.27.2 Objectives

1. Protect the relevant and important values of each designated ACEC as appropriate; historical, cultural, scenic, fish or wildlife resources, natural systems or processes, and natural hazards values within designated ACECs.

Note: Under all ACECs where travel prescriptions are stated “OHV limited” means all motorized and mechanized vehicle use.

2.27.3 Rationale for ACECs Not Included for Designation in the Preferred Alternative

Alternatives were developed to address issues identified during scoping including consideration of ACEC designation. Designation of ACECs occurs through the resource management planning process. FLPMA states, “Sec. 201. [43 U.S.C. 1711] (a) The Secretary shall prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values (including, but not limited to, outdoor recreation and scenic values), giving priority to areas of critical environmental concern.” ACEC designations are proposed to protect a variety of relevant and important values as outlined in Guidance Manual 1613 including historical, cultural, scenic, fish or wildlife resources, natural systems or processes, and natural hazards. The preferred alternative, Alternative C, protects these values by assigning ACEC designations to eight areas.

For eight other proposed ACECs not included for designation in Alternative C, the proposed management prescriptions that are more restrictive than current management are sufficient to protect the resource or value from risks or threats of damage/degradation. The eight proposed ACECs not included for designation in Alternative C are Laguna Plata, Birds of Prey Grasslands, Six Shooter Canyon, Boot Hill District, Maroon Cliffs, Desert Heronries, Carlsbad Chihuahuan Desert Rivers, and Salt Playas.

2.27.4 Relevance and Importance Values for Proposed ACECs

2.27.4.1 Birds of Prey Grasslands Proposed ACEC

Relevance and importance values for this ACEC were associated with one resource category, fish and wildlife resources. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these resources could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses. Such management prescriptions for this area would include mandatory raptor nest surveys prior to application approval and the avoidance of all inactive raptor nests by a minimum of 656 feet by all activities. Also, no yuccas or trees over 5 feet in height within this area can be damaged by vehicular use or any other activity associated with projects. For this reason, geographic separation was not deemed to be warranted.

2.27.4.2 Boot Hill District

Relevance and importance values for this ACEC were associated with two resource categories, cultural values and natural systems or processes. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses in the area. Such management prescriptions for this area would include major constraints applied to leases and prohibition of any surface-disturbing activities within 300 feet of the site boundary. For this reason, geographic separation was not deemed to be warranted.

2.27.4.3 Carlsbad Chihuahuan Desert Rivers

Relevance and importance values for this proposed ACEC were associated with historic values, cultural values, scenic values, fish or wildlife resources, natural system or process values, and natural hazards. A portion of this proposed ACEC will already be protected by two other proposed ACECs included in Alternative C, Cave Resources and Gypsum Soils. And it should be noted that a significant portion of the proposed Carlsbad Chihuahuan Desert Rivers ACEC encompasses State of New Mexico and private lands, where ACECs cannot be designated by the BLM. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values would be adequately protected by other proposed ACECs and existing regulations, even with the allowance of multiple uses in the area. For this reason, additional geographic separation beyond what is proposed in the Gypsum Soils and Cave Resources ACECs was not deemed to be warranted.

2.27.4.4 Desert Heronries

Relevance and importance values for this ACEC were associated with one resource category, fish and wildlife resources. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses. Such management prescriptions for this area would include the prohibition of surface-disturbing activity (e.g., drilling, mineral development and seismic activity) within 3,281 feet of an active heronry from February-July and limitations on noise disturbance. For this reason, geographic separation was not deemed to be warranted.

2.27.4.5 Laguna Plata

Relevance and importance values for this ACEC were associated with two resource categories, cultural values and fish or wildlife resources. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses in the area. Such management prescriptions for this area would include travel designations being limited to designated routes and allocating the entire area as no surface occupancy (NSO). For this reason, geographic separation was not deemed to be warranted.

2.27.4.6 Maroon Cliffs

Relevance and importance values for this ACEC were associated with one resource category, cultural values. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses. Such management prescriptions for this area would include travel designations being limited to designated routes and allocating the entire area as NSO. For this reason, geographic separation was not deemed to be warranted.

2.27.4.7 Salt Playas

Relevance and importance values for this ACEC were associated with two resource categories, cultural values and fish or wildlife resources. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses in the area. Such management prescriptions for this area would include limiting noise levels during the nesting season, buffering surface-disturbing activities from the edge of playas and floodplains (See Appendices C and T), and limiting travel to existing routes. For this reason, geographic separation was not deemed to be warranted.

2.27.4.8 Six Shooter Canyon

Relevance and importance values for this ACEC were associated with two resource categories, scenic values and natural system of process values. Given that the theme of Alternative C relies on management restrictions and/or direction to address resource conflict rather than geographic separation of uses or focused use or preservation areas, the interdisciplinary team felt that these relevance and importance values could be adequately protected with existing regulations and proposed management prescriptions for the area, even with the allowance of multiple uses in the area. Such management prescriptions for this area would include the prohibition of rock and plant collection and renewable energy development would be avoided in this area. For this reason, geographic separation was not deemed to be warranted.

Table 2-27. Alternatives for Special Designations – Areas of Critical Environmental Concern

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The followings ACECs would be designated (Map 2-53): • Lonesome Ridge (2,981 acres) • Pecos River/Canyons Complex (5,688 acres) • Blue Springs Riparian Habitat ACEC (444 acres) • Chosa Draw Cave Complex ACEC (2,797 acres) • Dark Canyon Scenic Area and ACEC (1,525 acres) Note: The Pecos Bluntnose Shiner Habitat was managed as an SMA, not an ACEC (201 acres) in the 1988 RMP. Note: Acreages between the No Action Alternative and action alternatives vary due to new GIS technology. **Total acreage**: **13,435 acres** Note: There are slight differences in acreages due to the way that GIS calculations are completed and because of number rounding.	The following ACECs would be designated (Map 2-54): • Cave Resources (19,625 acres) • Laguna Plata (4,496 acres) • Lonesome Ridge (3,021 acres) • Serpentine Bends (5,019 acres) • Pecos River Canyons Complex (4,115 acres) • Carlsbad Chihuahuan Desert Rivers (108,474 acres) • Birds of Prey Grasslands (349,355 acres) • Pecos Bluntnose Shiner Habitat (201 acres) • Six Shooter Canyon (735 acres) **Total acreage**: **495,041 acres**	The following ACECs would be designated (Map 2-55): • Cave Resources (19,625 acres) • Laguna Plata (4,496 acres) • Lonesome Ridge (3,021 acres) • Serpentine Bends (5,019 acres) • Pecos River Canyons Complex (4,115 acres) • Birds of Prey Grasslands (349,355 acres) • Pecos Bluntnose Shiner Habitat (201 acres) • Six Shooter Canyon (735 acres) • Seven Rivers Hills (1,027 acres) • Boot Hill District (1,065 acres) • Maroon Cliffs (8,659 acres) • Desert Heronries (48,708 acres) • Salt Playas (49,772 acres) • Gypsum Soils (65,553 acres) • Pope's Well (81 acres) **Total acreage**: **561,433 acres**	The following ACECs would be designated (Map 2-56): • Cave Resources (19,625 acres) • Lonesome Ridge (3,021 acres) • Serpentine Bends (5,019 acres) • Pecos Rivers Canyons Complex (4,115 acres) • Pecos Bluntnose Shiner Habitat (201 acres) • Seven Rivers Hills (1,027 acres) • Gypsum Soils (65,553 acres) **Total acreage**: **98,562 acres**	The following ACECs would be designated (Map 2-57): • Cave Resources (19,625 acres) • Lonesome Ridge (3,021 acres) • Serpentine Bends (5,019 acres) • Pecos Bluntnose Shiner Habitat (201 acres) • Seven Rivers Hills (1,027 acres) **Total acreage**: **28,894 acres**

2.27.4.9 Blue Springs Riparian Habitat ACEC

2.27.4.9.1 *Relevance and Importance Values*

Riparian and Fish and Wildlife.

2.27.4.9.2 *Goals*

1. Protect and enhance the ecological condition of springs and riparian zones.

2.27.4.9.3 *Objectives*

1. Encourage restrictions on surface-disturbing activities.
2. Encourage the removal livestock grazing to allow rapid recovery of riparian habitat.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-28. Alternatives for Blue Springs Riparian Habitat ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
An ACEC protection plan following the guidelines of the USFWS Pecos Gambusia Recovery Plan (USFWS 1983) would be developed for Blue Spring ACEC (444 acres): • **Leasables**: Open with major constraints • Pursue exchange or acquisition on 480 acres deeded and state surface lands and 200 acres of non-federal minerals • **Salables**: Open on 284 acres with standard terms and conditions • **Locatables**: Withdraw from mining claim location and close to mineral material disposal and solid mineral leasing • Restrict surface disturbance, including plant collections and camping within the area • Remove livestock from riparian and spring area only if acquisitions are completed • Exclude from solar renewable development on 160 acres, manage as an avoidance area for wind development on 160 acres • **Travel**: OHV limited on 160 acres • **VRM**: Class III and IV • **Grazing**: Open on 160 acres • **ROWs**: Avoid future ROW actions through 160 acres of the ACEC	The Blue Springs Riparian Habitat ACEC (444 acres) is under private ownership and is surrounded by private lands. Only the mineral estate is administered by the BLM. It would not be managed as an ACEC but would continue under many of the same management prescriptions as under the No Action Alternative, with the following exceptions: • **Salables**: Closed on all 444 acres • Exclude from wind development on 160 acres. Closed to geothermal development on 285 acres. • **ROWs**: Exclude future ROW actions through 160 acres of the ACEC	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

2.27.4.10 Lonesome Ridge ACEC

2.27.4.10.1 *Relevance and Importance Values*

Fish or wildlife resources, natural system or process, and scenic value.

2.27.4.10.2 *Goals*

1. Protect the scenic, fish and wildlife resources, and natural system process values within the Lonesome Ridge ACEC.

2.27.4.10.3 *Objectives*

1. Remove livestock from riparian and spring areas only if acquisitions are completed.
2. Restrict surface disturbance that would diminish the area's natural and scenic values.
3. Maintain habitat for the peregrine falcon (*Falco peregrinus*), Bell's vireo (*Vireo bellii*), and cave swallows (*Petrochelidon fulva*).
4. Protect karst landscapes and associated values.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-29. Alternatives for Lonesome Ridge ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Lonesome Ridge ACEC (2,981 acres,[1] including 86 acres of the Guadalupe Escarpment Scenic Area) would continue to be managed as an ACEC and an Outstanding Natural Area with the following management prescriptions: • **Leasables**: Closed in the Lonesome Ridge WSA portion of the ACEC (2,940 acres) and NSO in the remaining portion of the ACEC (41 acres) • **Locatables**: Withdraw 2,981 acres from future mining claim location • **Salables**: Close to solid mineral leasing and mineral material sales • Restrict surface disturbance that would diminish the area's natural and scenic values • **VRM**: Class I (2,940 acres), Class II (41 acres) • **Renewables**: Excluded for solar and closed to geothermal, excluded for wind on 2,940 and avoidance on 41 acres • **Travel**: Closed on 2,940 acres and OHV limited on 41 acres • **Grazing**: Open • **ROWs**: Open on 2,940 acres and avoidance on 41 acres The primary objective for the ONA is to provide adequate protection of the area's outstanding natural values in an unaltered condition.	Lonesome Ridge ACEC (3,021 acres) would continue to be managed as an ACEC with the following management prescriptions: • **Leasables**: Closed to development • **Salables**: Closed to salable development • **Locatables**: Recommended for withdrawal • **Travel:** Designate as closed to OHV use and implement plan to enforce designation • **VRM**: Class I • **Grazing**: Open • **ROWs**: Excluded	Same as Alternative A except: • **VRM:** Manage 2,981 acres as VRM I and 41 acres as VRM II	Same as Alternative A.	Same as Alternative A.

[1] The existing Lonesome Ridge ACEC is 2,981 acres. However, for the purposes of analysis the management prescriptions for the proposed ACEC size (3,021 acres) is included in the No Action Alternative.

2.27.4.11 Pecos River/Canyons Complex ACEC

2.27.4.11.1 *Relevance and Importance Values*

Natural system or process and scenic value.

2.27.4.11.2 *Goals*

1. Protect the scenic and natural system values within the Pecos River/Canyons Complex.

2.27.4.11.3 *Objectives*

1. Protect vegetative habitat for Tharp's bluestar within the Pecos River/Canyons Complex.
2. Restrict surface disturbance that would diminish the area's natural and scenic values.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-30. Alternatives for Pecos River/Canyons Complex ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Pecos River/Canyons Complex (5,688 acres) would continue to be managed as an ACEC with the following management prescriptions: • **Leasables**: Apply NSO stipulations to 4,250 acres of future oil and gas leases and manage as open with standard terms for the remainder (1,438 acres). (Note: The map and the acreage calculations put forth in the 1988 RMP were not accurate, hence the acreage discrepancy between the No Action Alternative and the action alternatives.) • **Salables**: Closed • **Locatables**: Recommend for withdrawal (2,743 acres), manage as open (1,371 acres) • **Renewables**: Excluded for solar and closed to geothermal; avoidance area for wind (570 acres) and exclusion area for wind (5,118 acres) • **Travel**: OHV limited on 4,730 acres, and closed on 953 acres • **Grazing**: Open • **VRM**: Class II • **ROWs**: Avoid future ROW actions on 4,244 acres and open on 1,433 acres • **Other**: Restrict surface disturbance throughout the ACEC to minimize environmental impacts and mitigate adverse effects to cultural resources through extensive excavation. • Attempt to acquire 960 acres of non-federal surface and 320 acres of non-federal minerals estate	The Pecos River/Canyons Complex (4,115 acres) would continue to be managed as an ACEC with the following management prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommend for withdrawal • Apply NSO in 100-year floodplains • **VRM**: Class II • **Travel**: OHV limited • **Renewables**: Closed to geothermal and excluded from wind and solar development. • **Grazing**: Open (3,411 acres), closed (641 acres) • **ROWs**: Excluded from ROW actions (including temporary surface pipelines) that are not associated with federal mineral leases within the boundary	Same as Alternative A with the exception of: • **Grazing**: Open (3,473 acres), closed (641 acres)	Same as Alternative A except 2,276 acres would be managed as VRM II and 1,839 acres would be managed as VRM III. Additionally, 4,115 acres would be open to grazing.	The Pecos River/Canyons Complex would not be managed as an ACEC. The area would be managed with the same management prescriptions as the surrounding area: • **Leasables**: Open with standard terms (3,696 acres), open with major constraints (418 acres) • **Salables**: Open with standard terms (3,697 acres), closed (418 acres) • **Locatables**: Open (3,697 acres) and recommend for withdrawal (418 acres) • **Renewables**: Open for wind and solar variance (3,696 acres), closed to geothermal and excluded from solar and wind (419 acres) • **VRM**: Class II (2,276 acres), Class III (1,839 acres) • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open (3,696 acres), closed (418 acres)

2.27.4.12 Dark Canyon Scenic Area ACEC

Please see the Cave Resources ACEC.

Table 2-31. Alternatives for Dark Canyon Scenic Area ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Dark Canyon Scenic Area and ACEC (1,525 acres), as well as the Manhole Caves (100 acres) and Mudgetts Caves (50 acres) SMAs would be managed according to the Dark Canyon ROD. The Dark Canyon relevant and important values are visual and natural processes. Note: The acreage listed in the 1988 RMP for the Dark Canyon Scenic Area was 3,220. However, current acreage for the Cave Resources ACEC 1,525) was used for the No Action Alternative in order to compare impacts consistently. Within the 3,950-acre Dark Canyon SMA, an NSO stipulation would be attached to oil and gas leases in 3,220 areas. A seasonal "no drilling" stipulation (aka timing limitation) would be in effect between April 1 and September 15 annually on the remaining 730 acres to reduce adverse visual impacts during the high use season at Carlsbad Caverns National Park. The management objectives for this SMA are to emphasize protection of high visual and natural resource values and rare plant species while still providing for other multiple resource uses. The Lechuguilla Cave Protection Act of 1993 established a Cave Protection Zone (CPZ) that conforms to the CPZ established in the Final Dark Canyon EIS (BLM 1993), except that an additional 360 acres are included, making this CPZ about 10,120 (surface) acres in size. Among the requirements of this act is the withdrawal of the lands in the CPZ from mineral and geothermal leasing. The CPZ is also excluded from renewable development. • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **VRM**: Class I (1,192 acres), II (70 acres), and III (263 acres) • **Travel**: Closed (1,158 acres) and OHV limited (367 acres) • **Renewables**: Closed to geothermal and excluded from solar development; excluded from wind (1,158 acres) and managed as wind avoidance (367 acres) • **Grazing**: Open • **ROWs**: Excluded from ROW actions on 1,158 acres (including temporary surface pipelines) that are not associated with federal mineral leases within the boundary. Avoidance on 367 acres.	The Dark Canyon Scenic ACEC (1,525 acres) would be managed as part of the proposed Cave Resources ACEC. The Dark Canyon Scenic ACEC is completely encompassed by the Cave Resources ACEC and the management prescribed under the Cave Resources ACEC would protect the relevant and important criteria that the Dark Canyon ACEC was found to have in the 1988 RMP. Please see Cave Resources ACEC for proposed management prescriptions. • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **VRM**: Class I (1,192 acres), II (70 acres), and III (263 acres). • **Travel**: Closed (1,158 acres) and OHV limited (367 acres) • **Renewables**: Closed to geothermal and excluded from wind, and solar development • **Grazing**: Open • **ROWs**: Excluded from ROW actions (including temporary surface pipelines) that are not associated with federal mineral leases within the boundary	Same as Alternative A., with the exception of: • **VRM:** Class I (1,262 acres), Class III (263 acres)	Same as Alternative A.	Same as Alternative A.

2.27.4.13 Birds of Prey Grasslands ACEC

2.27.4.13.1 *Relevance and Importance Values*

Fish or wildlife resources.

2.27.4.13.2 *Goals*

1. Protect the highly diverse population of birds of prey (raptors) and their habitat.

2.27.4.13.3 *Objectives*

1. Restrict surface-disturbing activities to protect birds of prey habitat.
2. Improve vegetative conditions.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-32. Alternatives for Birds of Prey Grasslands ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Birds of Prey Grasslands (349,355 acres) would not be designated as an ACEC under the No Action Alternative. The area is currently (would be) managed with the following prescriptions: • **Leasables**: Open on 201,443 acres with standard terms except subject to minor constraints for oil and gas leasing in the Aplomado falcon grasslands portion of the ACEC; open with moderate constraints on 138,311 acres; closed on 9,600 acres • **Salables**: Open with standard terms and conditions • **Locatables**: Open with standard terms and conditions • **Renewables**: Open for geothermal (49 acres) and solar variance (41,782 acres), excluded from solar (297,778 acres), and closed to geothermal (297,778 acres acres); open to wind (166,059 acres) and avoidance area for wind (174,446 acres) • **VRM**: Class III (83,278 acres), Class IV (266,045 acres) • **Travel**: OHV limited on 340,511 acres • **Grazing**: Open on 340,511 acres • **ROWs**: Open on 340,470 acres • Prescribed fires are subject to the Decision Record and Resource Management Plan Amendment for Fire and Fuels Management on Public Lands in New Mexico and Texas (BLM 2004). No yuccas or trees over 5 feet high would be damaged by vehicular use or any other activity associated with projects.	The Birds of Prey Grasslands ACEC (349,355 acres) would be designated and managed with the following prescriptions: • **Leasables**: Closed on 349,264 acres; open with moderate constraints on 91 acres • **Salables**: Open with standard terms and conditions on 94 acres; open with special terms and conditions (226,119 acres), closed (123,142 acres) • **Locatables**: Open with standard terms and conditions (320,594 acres), recommended for withdrawal (28,613 acres) • **Renewables**: Closed to geothermal development (8,884 acres) and excluded from solar (340,511 acres) and wind (339,915 acres) development • **VRM**: Class I (28,460 acres); Class II (31,051 acres), Class III (68,895 acres), Class IV (220, 934 acres) • **Travel**: Manage as OHV limited • **Grazing**: Closed (340,511 acres) • **ROWs**: Excluded (340,511 acres) • Prioritize interim reclamation enforcement of old producing well pads	Same as Alternative A, except for the following prescriptions: • **Leasables; closed (349,355)** • **Salables**: Open with special terms and conditions (196,357 acres), closed (152,997 acres) • **Locatables**: Open with standard terms and conditions (339,547 acres), recommended for withdrawal (9,661 acres) • **Grazing**: Open (339,061 acres), closed (1,450 acres)	The Birds of Prey Grasslands ACEC would not be designated. The area would be managed with the following prescriptions: • **Leasables**: Open with standard terms (226,302 acres), open with moderate constraints (122,951 acres) • **Salables**: Open with standard terms (225,965 acres), open with special terms and conditions (123,024 acres), closed (200 acres) • **Locatables**: Open (349,253 acres) • **Renewables**: Open for geothermal (8,668 acres), closed for geothermal (81 acres), manage as variance for solar (4,486 acres) and excluded to solar (335,927 acres) Wind: Open (596 acres), avoid (339,808 acres **VRM:** Class III (128,418 acres), Class IV (220,934 acres) • **Travel**: OHV limited • **Grazing**: Open (339,058 acres), closed (1,420 acres) • **ROWs**: Open (217,629 acres), avoid (122,775 acres)	The Birds of Prey Grasslands ACEC would not be designated. The area would be managed with the following prescriptions: • **Leasables**: Open with standard terms (254,777 acres) and open with moderate constraints (95,504) acres • **Salables**: Open with standard terms (254,536 acres); open with special terms and conditions (94,472 acres); closed (200 acres) • **Locatables**: Open with standard terms and conditions (349,282 acres) • **Renewables**: Open for geothermal (8,758 acres), closed for geothermal (81 acres), manage as variance for solar (4,484 acres) and excluded to solar (335,932 acres) Wind: Open (4,477 acres), avoid (335,928 acres) • **VRM**: Class III (114,222 acres), Class IV (235,130 acres) • **Travel**: OHV limited (340,511 acres) • **Grazing**: Open (339,061 acres), closed (1,450 acres) • **ROWs:** Open (251,389 acres), avoid (89.023 acres)

2.27.4.14 Boot Hill District ACEC

2.27.4.14.1 *Relevance and Importance Values*

Cultural value and natural systems or processes.

2.27.4.14.2 *Goals*

1. Protect the cultural and paleontological resources within Boot Hill District ACEC.

2.27.4.14.3 *Objectives*

1. Restrict surface disturbance activities to protect cultural and paleontological resources.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-33. Alternatives for Boot Hill District ACEC (1,065 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Boot Hill District would not be designated as an ACEC. It would be managed as the Poco Site CRMA (1,065 acres). The management objective for this CRMA is to protect and preserve the importance and sensitive cultural resource values for research. • Restrict surface disturbance and apply the special stipulation: No surface disturbance until a representative sample of the entire site is excavated • **Leasables**: Open with standard terms (679 acres), open with moderate constraints (387 acres) • **Salables**: Open • **Locatables**: Open • **Renewables**: Closed to geothermal and excluded from solar; open for wind (679 acres), avoidance area for wind (387 acres) • **VRM**: Class IV • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open Poco Site (51 acres) 1. Restrict surface disturbance and apply the special stipulation: No surface disturbance until a representative sample of the entire site is excavated. 2. Designate limited to ORV use to designated routes and implement plan to enforce designation. 3. Restrict fire suppression to conform with ORV designation.	The Boot Hill District (1,065 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with major constraints for leasable development • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **VRM**: Class IV • **Renewables**: Closed to geothermal and excluded from solar and wind • **Travel**: Close specific routes in the upcoming travel and transportation management plan, but until such time manage as OHV limited • **Grazing**: Open • **ROWs**: Excluded • Oil and gas geophysical exploration activities would conform with travel and transportation management plan decisions • No surface-disturbing activities within 300 feet of the Boothill site boundary	The Boot Hill District (1,065 acres) would be designated as an ACEC and managed with the following prescriptions • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **VRM**: Class IV • Renewables: Closed to geothermal and excluded from solar and wind • **Travel**: Close specific routes in the upcoming travel and transportation plan, but until such time manage as OHV limited • **Grazing:** Open • **ROWs:** Excluded • Oil and gas geophysical exploration activities would conform with travel and transportation management plan decisions • No surface-disturbing activities within 300 feet of the Boothill site boundary	The Boot Hill District ACEC would not be designated but would be managed with the following prescriptions (same as Alternative A): • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **VRM**: Class IV • Renewables: Closed to geothermal, and excluded from solar and wind • **Travel**: Close specific routes in the upcoming travel and transportation plan but until such time manage as OHV limited • **Grazing**: Open • **ROWs**: Excluded • Oil and gas geophysical exploration activities would conform with travel and transportation management plan decisions • No surface-disturbing activities within 300 feet of the Boothill site boundary	The Boot Hill District ACEC would not be designated but would be managed with the following prescriptions (same as Alternative A): • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **VRM**: Class IV • Renewables: Closed to geothermal and excluded from solar and wind • **Travel**: Close specific routes in the upcoming travel and transportation plan but until such time manage as OHV limited • **Grazing: Open** • **ROWs**: Excluded • Oil and gas geophysical exploration activities would conform with travel and transportation management plan decisions • Apply the standard 100-foot buffer to protect the context of the sites

2.27.4.15 Carlsbad Chihuahuan Desert Rivers ACEC

2.27.4.15.1 *Relevance and Importance Values*

Cultural value, fish or wildlife resources, historic value, natural hazards, natural system or process, and scenic value.

2.27.4.15.2 *Goals*

1. Protect the historic, cultural, scenic, T&E and SSS plant and animal species, geologic features, paleontological resources, soils and riparian resources.

2.27.4.15.3 *Objectives*

1. Restrict surface-disturbing activities.
2. Limit access to hazardous geologic areas.
3. Limit access to historic sites to protect historic structures and natural features.
4. Maintain habitat for threatened and endangered and special status plant and animal species.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-34. Alternatives for Carlsbad Chihuahuan Desert Rivers ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Carlsbad Chihuahuan Desert Rivers area (108,483 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms and conditions (101,573 acres), open with major constraints (4,112 acres), closed (2,799 acres) • **Salables**: Open with standard terms and conditions (102,881 acres), closed (5,566 acres) • **Locatables**: Open (102,378 acres), recommend for withdrawal (6,103 acres): • **Renewables**: Closed to geothermal and excluded from solar; open for wind (38,930 acres), avoid for wind (64,903 acres) • **VRM**: Class II (3,389 acres), Class III (19,288 acres), Class IV (81,156 acres) • **Travel**: OHV limited (101,820 acres), closed (2,012 acres) • **Grazing**: Open (102,056 acres), closed (1,777 acres) • **ROWs**: Open (102,269 acres), avoidance area (1,557 acres) Note: Acreages are approximate and may not match exactly under each alternative due to slight variations in GIS layers. The Yeso Hills RNA represents only 560 acres of the proposed Carlsbad Chihuahuan Desert Rivers ACEC (103,800 acres). • Planned actions for the Yeso Hills RNA include no surface disturbance and removal of livestock grazing, except where beneficial for research purposes • Apply NSO stipulations to future oil and gas leases	The Carlsbad Chihuahuan Desert Rivers ACEC (108,474 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with standard terms and conditions (71,191 acres), open with major constraints (10,225 acres), closed (27,058 acres) • **Salables**: Open with standard terms and conditions (71,192 acres), closed (37,290 acres) • **Locatables**: Open (77,487 acres), recommend for withdrawal (30,955 acres) • **Renewables**: Open for geothermal (2,501 acres) closed to geothermal (2,130 acres), variance for solar (69,178 acres) excluded from solar (34,649, Open to wind (68,679 acres), excluded to wind (35,148 acres) • **VRM**: Class II (12,231 acres), Class III (27,955 acres), Class IV (68,287 acres) • **Travel**: OHV limited (101,880 acres), closed (1,953 acres) • **Grazing**: Closed (103,815 acres) • **ROWs**: Open (68,676 acres), exclusion area (35,148 acres)	The Carlsbad Chihuahuan Desert Rivers ACEC (108,472 acres) would not be designated but would be managed with the following prescriptions: • **Leasables**: Open with standard terms and conditions (66,003 acres), open with moderate constraints (3,196 acres), open with major constraints (32,321 acres), closed (6,952 acres) • **Salables**: Open with standard terms and conditions (68,866 acres), open with special terms and conditions (419 acres), closed (39,192 acres) • **Locatables**: Open (69,787 acres), recommended for withdrawal (38,658 acres) • **Renewables**: Open for geothermal, (2,482 acres), closed to geothermal (2,166 acres), variance for solar (66,439 acres), excluded from solar (37,379 acres), avoidance for wind (387 acres), excluded from wind (37,027 acres), open for wind (66,409 acres) • **VRM**: Class II (28,138 acres), Class III (16,198 acres), Class IV (64,135 acres) • **Travel**: OHV limited (101,880 acres), closed (1,953 acres) • **Grazing**: Open (40,455 acres), closed (63,371 acres) • **ROWs**: Open (65,990 acres), avoidance area (806 acres), exclusion area (37,023 acres)	The Carlsbad Chihuahuan Desert Rivers ACEC (108,473 acres) would not be designated but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (73,759 acres), open with moderate constraints (22,719 acres), open with major constraints (5,629 acres), closed (6,365 acres) • **Salables**: Open (75,241 acres), open with special terms and conditions (20,213 acres), closed (12,981 acres) • **Locatables**: Open with standard terms and conditions (96,452 acres), recommended for withdrawal (11,993 acres) • **Renewables**: Open for geothermal (2,557 acres), closed to geothermal (2,091 acres), variance for solar (66,872 acres), excluded to solar (36,943 acres), open to wind (71,113 acres), avoidance for wind (16,030 acres), excluded from wind (16,671 acres) • **VRM**: Class II (12,601 acres), Class III (31,155 acres), Class IV (64,705 acres) • **Travel**: OHV limited (102,576 acres), closed (1,257 acres) • **Grazing**: Open (98,663 acres), closed (5,168 acres) • **ROWs**: Open (71,118 acres), avoidance area (21,293 acres), exclusion area (11,439 acres)	The Carlsbad Chihuahuan Desert Rivers ACEC (108,484 acres) would not be designated but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (94,230 acres), open with moderate constraints (2,847 acres), open with major constraints (8,608 acres), closed (2,799 acres) • **Salables**: Open (95,345 acres), open with special terms and conditions (3,977 acres), closed (9,147 acres) • **Locatables**: Open with standard terms and conditions (99,294 acres), recommended for withdrawal (9,148 acres) • **Renewables**: Open for geothermal (3,714 acres), closed to geothermal (933 acres), variance for solar (90,513 acres), excluded to solar (13,316 acres), open to wind (90,054 acres), avoidance for wind (2,998 acres), excluded from wind (10,770 acres) • **VRM**: Class II (11,411 acres), Class III (29,007 acres), Class IV (68,051 acres) • **Travel**: OHV limited (102,576 acres), closed (1,257 acres) • **Grazing**: Open (102,516 acres), closed (1,316 acres) • **ROWs**: Open (90,509 acres), avoidance area (4,792 acres), exclusion area (8,516 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
• Avoid future ROW actions through the RNA • Withdraw from mining claim location and close to mineral material disposal and solid mineral leasing • Designated limited to OHV use and implement plan to restrict vehicles to designated routes • Restrict geophysical operations to comply with OHV designations • Restrict surface disturbance including plant collections and camping within the area • Remove livestock from the area except under conditions established for studies or research purposes The Springs Riparian HMA represents only a portion of the proposed Carlsbad Chihuahuan Desert Rivers ACEC (103,800 acres). The management objective for these areas is to protect and enhance ecological condition for 524 acres of springs and associated riparian zones. • Apply NSO stipulation to future oil and gas leases. • Avoid future ROW actions through the riparian habitat areas. • Withdraw from mining claim location and close to mineral material disposal and solid mineral leasing. • Restrict geophysical operations to comply with OHV designations. • Restrict surface disturbance including plant collections and camping within the area. • Remove livestock from areas to allow rapid recovery of riparian habitat. Grazing management practices to enhance riparian habitat would be studied and implemented following initial recovery of the habitat areas.				

2.27.4.16 Cave Resources ACEC

2.27.4.16.1 *Relevance and Importance Values*

Cultural value, fish or wildlife resources, fish or wildlife value, historic value, natural hazards, and natural system or process.

2.27.4.16.2 *Goals*

1. Protect the historical, cultural, scenic, fish or wildlife resource, natural system or process, and natural hazard, values within the Cave Resources ACEC.

2.27.4.16.3 *Objectives*

1. Manage the Cave Resources ACEC cave and karst resources for preservation and protection for appropriate uses for present and future generations.
2. Manage to maintain karst landscapes in un-fragmented natural form, for the enhancement of groundwater recharge and protection to the extent possible.
3. Restrict surface-disturbing activities.
4. Conduct biological inventories in each designated Cave ACEC management area.

Note: A map of the area can be found in Appendix K – ACECs.
Note: The proposed Cave Resources ACEC contains the area previously designated as the Dark Canyon Scenic ACEC.
Note: Due to the length of the individual unit prescriptions the format of the five columns has been changed from vertical to horizontal to save space.

Table 2-35. Alternatives for Cave Resources ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Cave Resources area would not be designated as an ACEC. Nine cave management units would be protected and intensively managed. The area would be managed with the following prescriptions: • **Leasables**: Open with standard terms and conditions (8,554 acres), open with moderate constraints (13 acres), closed (11,058 acres) • **Salables**: Open with standard terms and conditions (9,105 acres), closed (10,520 acres) • **Locatables**: Open (11,079 acres), recommended for withdrawal (9,141 acres) • **Renewables**: Variance for solar (682 acres), excluded from solar (18,150 acres), avoidance for wind (18,237 acres), excluded for wind (595 acres) • **VRM**: Class I (595 acres), Class II (6,242 acres), Class III (7,651 acres), Class IV (6,065 acres) • **Travel**: OHV limited (18,237 acres), closed (595 acres) • **Grazing**: Open (18,832 acres) • **ROWs**: Open (11,768 acres), avoidance area (7,064 acres), exclude (595 acres) Cave Resources SMA, Guadalupe Escarpment Scenic Area, Mudgetts WSA, Dark Canyon ACEC/Dark Canyon Scenic and Dry Cave management prescriptions would apply where there is overlap with the proposed Cave Resources ACEC area. Prescriptions outside of those listed above would be as follows: **Cave Resources SMA** Management objectives are to protect the scenic and other natural values of all cave resources while still allowing for recreation, education, and scientific use. • Manage under VRM class guidelines as identified for each cave unit. - McKittrick Hill Unit – VRM Class II - Chosa Draw Unit – VRM Class III - Sinkhole Flats Unit – VRM Class IV - Burton Flats Unit – VRM Class IV - Fence Canyon Unit – VRM Class II and III - Yellow Jacket Unit – VRM Class II - Boyd's Cave Unit – VRM Class III and IV - Lost Cave Unit – VRM Class II - Manhole/Mudgetts Unit – VRM Class I and II	The Cave Resources ACEC (19,625 acres), which includes Boyd's Cave, Burton's Flat Cave Complex, Chosa Draw Caves, Fence Canyon Caves, Lost Cave, Manhole/Mudgetts Caves, McKittrick Hill Caves, Sinkhole Flats, and Yellowjacket Cave, would be designated and would be managed with the following prescriptions: • **Leasables**: Open with major constraints (6,128 acres), closed (13,497 acres) • **Salables**: Closed (19,625 acres) • **Locatables**: Recommended for withdrawal (19,625 acres) • **Renewables**: Closed to geothermal (793 acres), excluded from solar and wind development (18,832 acres) • **VRM**: Class I (629 acres), Class II (14,001 acres), Class III (4,995 acres) • **Travel**: OHV limited (18,237 acres), closed (595 acres) • **Grazing**: Open (14,316 acres), closed (4,516 acres) • **ROWs**: Excluded (18,832 acres)	Same as Alternative A.	Same as Alternative A, except: **Locatables**: 798 acres would be open to locatable mineral development (18,8247 acres recommended for withdrawal) **Renewables**: 241 acres would be open for geothermal development **VRM:** Class I (629 acres), Class II (13,863 acres), Class III (5,133 acres) **Grazing**: the entire area would be open to grazing. **ROWs**: Avoidance area (573 acres); exclude (18,259 acres)	The Cave Resources ACEC (19,625 acres), which includes Boyd's Cave, Burton's Flat Cave Complex, Chosa Draw Caves, Fence Canyon Caves, Lost Cave, Manhole/Mudgetts Caves, McKittrick Hill Caves, Sinkhole Flats, and Yellowjacket Cave, would be designated and would be managed with the following prescriptions: • **Leasables**: Open with major constraints (8,538 acres), closed (11,087 acres) • **Salables**: Open with moderate constraints (2,424 acres), Closed (19,625 acres) • **Locatables**: Open with standard terms and conditions (2,4,24 acres) Recommended for withdrawal (17,201 acres) • **Renewables**: Open to geothermal (241 acres) Closed to geothermal (552 acres acres), excluded from solar and wind development (18,832 acres) • **VRM**: Class I (629 acres), Class II (14,001 acres), Class III (4,995 acres) • **Travel**: OHV limited (18,237 acres), closed (595 acres) • **Grazing**: Open (18,832 acres) • **ROWs**: Avoidance area (2,979 acres), Excluded (15,853 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Dry Cave (420 acres) would be designated as an RNA specifically for paleontological research and managed with the following prescriptions: • Stipulations providing for no surface disturbance and fencing to exclude livestock from 10 acres would protect the essential habitat in the RNA while providing research opportunities to determine biological requirements. • Evaluate all surface disturbances on a case-by-case basis to determine whether they would be detrimental to the ramshorn snail and its habitat in the RNA.				
See prescriptions in the row above.	**<u>Individual Unit Prescriptions for Alternatives A–D would be the same under each alternative, and are as follows</u>:** **McKittrick Hill Unit**: • Close to future oil and gas leasing. • Exclude future ROW actions through the unit. Exceptions would be made for the development of existing rights within the unit. • Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Existing oil and gas leases falling partially within the ACEC would be developed from outside the ACEC boundary. • Require master development plans for existing oil and gas leases. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. • Exclude oil and gas geophysical exploration within the ACEC boundary. • Manage for VRM Class II objectives within the ACEC boundary. **Chosa Draw Unit**: • Close to future oil and gas leasing. • Exclude future ROW actions through the unit. Exceptions would be made for the development of existing rights within the unit. • Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Existing oil and gas leases falling partially within the ACEC would be developed from outside the ACEC boundary. Existing oil and gas leases falling entirely within the ACEC boundary would be developed from outside the ACEC boundary or from existing locations within the ACEC boundary. • Require master development plans for existing oil and gas leases. • Limit all motorized vehicle use including fire suppression activities to designated routes. • Exclude oil and gas geophysical exploration within the ACEC boundary. • Manage for VRM Class II objectives within the ACEC boundary. Cave entrances popular with recreational users and designated camping areas would be used as key observation points (KOPs). **Sinkhole Flats Unit**: • Apply NSO to leasable mineral development. • Exclude future ROW actions through the unit. Exceptions would be made for the development of existing rights within the unit that are not accessible without obtaining a ROW due to lease boundaries. • Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Existing oil and gas leases falling partially within the ACEC would be developed from outside the ACEC boundary. Existing oil and gas leases falling entirely within the ACEC boundary would be developed from outside the ACEC boundary or from existing locations within the ACEC boundary. • Require master development plans for existing oil and gas leases. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. • Manage for VRM Class II objectives within the ACEC boundary. Cave entrances popular with recreational users would be used as KOPs.			

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
	Burton Flats Unit: • Apply NSO to leasable mineral development. • Exclude future ROW actions through the unit. Exceptions would be made for the development of existing rights within the unit. • Withdraw from mining claim location and close to mineral material disposal. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. • Manage for VRM Class III objectives within the ACEC boundary. Cave entrances popular with recreational users would be used as KOPs. **Fence Canyon Unit**: • Close entire unit to future oil and gas leasing. • Exclude future ROW actions through the unit. Exceptions would be made for the development of existing rights within the unit. • Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. • Manage for VRM Class II objectives within the ACEC boundary. Cave entrances and established camping areas would be used as KOPs. **Yellowjacket Cave Unit**: • Close to future oil and gas leasing. • Exclude future ROW actions through the unit. Exceptions would be made for the development of existing rights within the unit. • Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. **Boyd's Cave Unit**: • Apply NSO to leasable mineral development. • Exclude future ROW actions through the unit. Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Existing oil and gas leases falling partially within the ACEC would be developed from outside the ACEC boundary. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. **Lost Cave Unit**: • Apply NSO to leasable mineral development. • Exclude future ROW actions within 984 feet of Lost Cave. • Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. • Manage for VRM Class III objectives within the ACEC boundary. **Manhole/Mudgetts Cave Unit**: • Close to future oil and gas leasing. • Exclude future ROW actions through the unit. Withdraw from mining claim location and close to solid mineral leasing and mineral material disposal. • Limit all motorized vehicle use, including fire suppression activities, to designated routes. • Manage for VRM Class I objectives within the ACEC boundary. All locations within the unit would be used as a KOP.			

2.27.4.17 Desert Heronries ACEC

2.27.4.17.1 *Relevance and Importance Values*

Fish or wildlife resources.

2.27.4.17.2 *Goals*

1. Protect the fish or wildlife resource and habitat values within the Desert Heronries ACEC.

2.27.4.17.3 *Objectives*

1. Protect and enhance stands of western soapberry (*Sapindus saponaria*) used by the great blue heron (*Ardea herodias*) for nesting.
2. Restrict surface-disturbing activities in riparian areas and playas.

2.27.4.17.4 *Management Common to All Alternatives*

1. From February to July, no surface-disturbing activities would be allowed within 3,281 feet around heronries. From August to January, surface-disturbing activities would be reduced to a 1,312 feet buffer (See Appendices C and T). Surface-disturbing activities include drilling, mineral development, earthen industrial (frac) ponds, reserve pits, recreational use (including motorized), and seismic use. Noise from permanent (>90 days) structures within 3,281 feet of any heronry would be limited to 49 decibels, not to exceed 10 decibels above ambient noise level measured 30 feet from the source of the noise.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-36. Alternatives for Desert Heronries ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Desert Heronries area (48,708 acres) would not be managed as an ACEC, but would be managed with the following prescriptions: • Manage the area as closed to leasable development in the Maroon Cliffs Arch District, open with moderate constraints in the Phantom Banks Heronries, and open in the remainder of the area that would be designated as an ACEC under Alternative B. • **Leasables**: Open with standard terms (18,149 acres), open with moderate constraints (29,761 acres), open with major constraints (801 acres) • **Salables**: Open with standard terms (20,736 acres), closed (27,974 acres) • **Locatables**: Open • **Renewables**: Excluded from solar, avoid for wind (31,710 acres) and open to wind (16,764 acres) • **VRM**: Class III (720 acres), Class IV (47,991 acres) • **Travel**: OHV limited (48,393 acres), closed (81 acres) • **Grazing**: Open (48,393 acres), closed (81 acres) • **ROWs**: Open (47,674 acres), avoid (801 acres) • Apply special stipulation for solid mineral leasing: New leases or reissuance of existing lease would require mitigation of adverse effect to cultural resources through extensive excavation (11,783 acres)	The Desert Heronries ACEC (48,708 acres) would not be designated but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (33,946 acres), open with moderate constraints (1,737 acres), open with major constraints (10,823 acres), closed (2,202 acres) • **Salables**: Open with standard terms (33,945 acres), open with special terms and conditions (1,737 acres), closed (13,025 acres) • **Locatables**: Open (35,682 acres), recommended for withdrawal (13,025 acres) • **Renewables**: Open for geothermal (236 acres), variance for solar (35,447 acres) and excluded for solar (13,025 acres), open for wind (33,709 acres) and excluded to wind (13,025 acres) • **VRM**: Class III (720 acres), Class IV (47,991 acres) • **Travel**: OHV limited (48,393 acres), closed (81 acres) • **Grazing**: Open (36,141 acres), closed (12,330 acres) • **ROWs**: Open (33,709 acres), avoid (1,737 acres), excluded (13,025 acres)	The Desert Heronries ACEC (48,708 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with standard terms (33,946 acres), open with moderate constraints (1,737 acres), open with major constraints (13,025 acres) • **Salables**: Open (33,945 acres), open with special terms and conditions (1,737 acres), closed (13,025 acres) • **Locatables**: Open (35,683 acres), recommended for withdrawal (13,025 acres) • **Renewables**: Open to geothermal (236 acres), variance for solar (35,446 acres) and excluded from solar (13,025 acres), exclude from wind (13,025 acres), avoid for wind (1,615 acres), open to wind (33,831 acres) • **VRM**: Class IV (47,991 acres), Class II (720 acres) • **Travel**: OHV limited (48,393 acres), closed (81 acres) • **Grazing**: Closed (48,474 acres) • **ROWs**: Open (33,708 acres), avoid (1,737 acres), excluded (13,025 acres)	The Desert Heronries area (48,708 acres) would not be designated as an ACEC but would be managed with the following: • **Leasables**: Open with standard terms (35,683 acres), open with moderate constraints (12,224 acres), open with major constraints (801 acres) • **Salables**: Open (45,708 acres), open with special terms and conditions (2,202 acres), closed (801 acres) • **Locatables**: Open (47,910 acres), recommended for withdrawal (801 acres) • **Renewables**: Open for geothermal (236 acres), excluded to solar (13,025 acres) and variance for solar (35,446 acres), open to wind (35,446 acres), excluded from wind (801 acres), avoidance for wind (12,224 acres) • **VRM**: Class IV (47,991 acres), Class III (720 acres) • **Travel**: OHV limited (48,393 acres), closed (81 acres) • **Grazing**: Open (48,393 acres), closed (81 acres) • **ROWs**: Open (35,446 acres), avoid (12,224 acres), excluded (801 acres)	The Desert Heronries area (48,708 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (37,785 acres), open with moderate constraints (10,122 acres), open with major constraints (801 acres) • **Salables**: Open (47,910 acres), closed (801 acres) • **Locatables**: Open (47,910 acres), recommended for withdrawal (801 acres) • **Renewables**: Open to geothermal (236 acres), variance for solar (37,549 acres), and exclude from solar (10,923 acres), and open to wind (37,549 acres), excluded from wind (801 acres), avoidance for wind (10,122 acres) • **VRM**: Class IV (47,991 acres), Class III (720 acres) • **Travel**: OHV limited (48,393 acres), closed (81 acres) • **Grazing**: Open (48,393 acres), closed (81 acres) • **ROWs**: Open (37,549 acres), avoid (10,122 acres), excluded (801 acres)

2.27.4.18 Gypsum Soils ACEC

2.27.4.18.1 *Relevance and Importance Values*

Cultural value, fish or wildlife resources, historic value, natural hazards, natural system or process, and scenic value.

2.27.4.18.2 *Goals*

1. Protect the historical, cultural, scenic, fish and wildlife resources, natural systems or processes, and eliminate or reduce natural hazards within the Gypsum Soils ACEC.

2.27.4.18.3 *Objectives*

1. Restrict surface-disturbing activities.
2. Limit access to hazardous geologic areas.
3. Limit access to historic sites to protect historic structures and natural features.
4. Maintain habitat for threatened and endangered and special status plant and animal species.
5. Protect gypsum wild buckwheat (*Eriogonum gypsophilum*) populations.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-37. Alternatives for Gypsum Soils ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Gypsum Soils area (65,564 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard lease terms and conditions (57,932 acres), open with major constraints (4,833 acres), closed (2,799 acres) • **Salables**: Open (59,998 acres) closed (5,562 acres) • **Locatables**: Open (59,462 acres), withdrawn (6,100 acres) • **Renewables**: Closed to geothermal, excluded from solar, open (10,590 acres) and avoid (51,711 acres) for wind development • **VRM**: Class II (2,467 acres), Class III (19,310 acres), and VRM Class IV (43,969 acres) • **Travel**: OHV limited (60,009 acres), closed (2,291 acres) • **Grazing**: Open (60,445 acres), closed (1,857 acres) • **ROWs**: Open (60,745 acres) and avoid (1,557 acres) Note: Acreages are approximate and may not match exactly under each alternative due to slight variations in GIS layers. Note: In the 1988 RMP this area was managed as the Guadalupe Escarpment Scenic Area, the Yeso Hills RNA, and the Springs Riparian HMA.	The Gypsum Soils area (65,562 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard lease terms and conditions (32,575 acres), open with major constraints (6,263 acres), closed (26,723 acres) • **Salables**: Open (32,576 acres), closed (32,988 acres) • **Locatables**: Open (36,154 acres), withdrawn (29,404 acres) • **Renewables**: Open area for geothermal (1,367 acres), closed to geothermal (1,883 acres), variance for solar (31,613 acres) and excluded from solar (30,687 acres), open to (31198 acres), exclusion area for wind (31,102 acres) • **VRM**: Class II (11,995 acres), Class III (26,336 acres), Class IV (27,223 acres) • **Travel**: OHV limited (60,072 acres), closed (2,229 acres) • **Grazing**: Open (1,760 acres), closed (60,534 acres) • **ROWs**: Open (31,195 acres), excluded (31,102 acres)	The Gypsum Soils ACEC (65,553 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with standard lease terms and conditions (27,961 acres), open with moderate constraints (2,970 acres), open with major constraints (27,531 acres), closed (7,090 acres) • **Salables**: Open (30,518 acres), open with special terms and conditions (423 acres), closed (34,623 acres) • **Locatables**: Open (31,148 acres), withdrawn (34,412 acres) • **Renewables**: Open for geothermal (1,378 acres) closed for geothermal (1,885 acres), Variance for solar (29,507 acres) and excluded for solar (32,784 acres), and open for wind (29,539 acres), avoid for wind (18 acres) and exclude from wind (32,735 acres) • **VRM**: Class II (25,993 acres), Class III (16,136 acres), Class IV (23,424 acres) • **Travel**: OHV limited (60,072 acres), closed (2,229 acres) • **Grazing**: Closed (62,300 acres) • **ROWs**: Open (29,115 acres), avoid (441 acres), excluded (32,735 acres)	The Gypsum Soils ACEC (65,554 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with standard lease terms and conditions (33,947 acres), open with moderate constraints (19,332 acres), open with major constraints (5,067 acres), closed (6,608 acres) • **Salables**: Open (33,969 acres), open with special terms and conditions (19,750 acres), closed (11,831 acres) • **Locatables**: Open (53,891 acres), withdrawn (11,668 acres) • **Renewables**: Closed to geothermal (1,813 acres) and open to geothermal (1,450 acres), excluded from solar (32,658 acres) and variance for solar (29,627 acres), excluded from wind (15,233 acres), avoid (14,560 acres), and open (32,493 acres) • **VRM**: Class II (12,019 acres), Class III (29,541 acres) and Class IV (23,989 acres) • **Travel**: OHV limited (60,967 acres), closed (1,335 acres) • **Grazing**: Open (57,405 acres), closed (4,896 acres) • **ROWs**: Open (32,498 acres), avoid (18,781 acres), and excluded (11,044 acres)	The area (65,564 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard lease terms and conditions (53,997 acres), open with moderate constraints (371 acres), open with major constraints (8,397 acres), closed (2,799 acres) • **Salables**: Open (53,991 acres), Open with special terms and conditions (2,793 acres) closed (8,771 acres) • **Locatables**: Open (56,790 acres), withdrawn (8,766 acres) • **Renewables**: Open for geothermal (2,553 acres) and closed to geothermal (710 acres), variance for solar (51,756 acres) and excluded from solar (10,541 acres), open to wind (51,355 acres), excluded from wind (10,556 acres), avoidance for wind (381 acres) • **VRM**: Class II (11,198 acres), Class III (27,152 acres), Class IV (27,201 acres) • **Travel**: OHV limited (60,967 acres), closed (1,335 acres) • **Grazing**: Open (60,905 acres), closed (1,396 acres) • **ROWs**: Open (51,441 acres), avoid (2,709 acres), excluded (8,135 acres)

2.27.4.19 Laguna Plata ACEC

2.27.4.19.1 *Relevance and Importance Values*

Cultural value and fish or wildlife resources.

2.27.4.19.2 *Goals*

1. Protect the cultural, and fish or wildlife resource values within the Laguna Plata ACEC.

2.27.4.19.3 *Objectives*

1. Protect and enhance habitat for the snowy plover (*Charadrius nivosus*).
2. Restrict surface-disturbing activities especially on alkali lake flats and in culturally sensitive areas.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-38. Alternatives for Laguna Plata ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Laguna Plata area (4,496 acres) would not be designated as an ACEC, but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (41 acres), open with major constraints (3,659 acres), closed (796 acres) • **Salables**: Open with standard terms (41 acres), closed (4,455 acres) • **Locatables**: Open (4,496 acres) • **Renewables**: Excluded from solar development; avoidance area for wind (4,455 acres), open to wind (41 acres) • **VRM**: Class III (4,455 acres) and Class IV (41 acres) • **Travel**: OHV limited (1,483 acres), closed (3,010 acres) • **Grazing**: Open (4,496 acres) • **ROWs**: Open (41 acres), avoid (4,455 acres)	The Laguna Plata ACEC (4,496 acres) would be designated and managed with the following management prescriptions: • **Leasables**: Open with moderate constraints (1,299 acres), Open with major constraints (2,401 acres), closed (796 acres) • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Excluded	Same as Alternative A, except area would be closed to grazing.	Laguna Plata (4,496 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with major constraints (4,496 acres) • **Salables**: Closed (4,496 acres) • **Locatables**: Recommended for withdrawal (4,496 acres) • **Renewables**: Excluded from solar and wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Excluded	Same as Alternative C.

2.27.4.20 Maroon Cliffs ACEC

2.27.4.20.1 *Relevance and Importance Values*

Cultural value.

2.27.4.20.2 *Goals*

1. Protect the cultural values within the Maroon Cliffs ACEC.

2.27.4.20.3 *Objectives*

1. Restrict surface-disturbing activities.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-39. Alternatives for Maroon Cliffs ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Maroon Cliffs area (8,659 acres) would not be designated as an ACEC, but would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Open • **Renewables**: Excluded from solar, avoidance area for wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Avoid	The Maroon Cliffs area (8,659 acres) would not be designated as an ACEC, but would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open (8,299 acres), closed (360 acres) • **ROWs**: Exclude	The Maroon Cliffs ACEC (8,659 acres) would be designated as an ACEC with the following management prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Closed • **ROWs**: Exclude	The Maroon Cliffs area would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **VRM**: Class III • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Exclude	Same as Alternative C.

2.27.4.21 Pecos Bluntnose Shiner Habitat ACEC

2.27.4.21.1 *Relevance and Importance Values*

Fish or wildlife resources.

2.27.4.21.2 *Goals*

1. Protect the fish resource values within the Pecos Bluntnose Shiner Habitat ACEC

2.27.4.21.3 *Objectives*

1. Restrict surface-disturbing activities.
2. Maintain quality habitat.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-40. Alternatives for Pecos Bluntnose Shiner Habitat ACEC (200 acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Pecos Bluntnose Shiner Habitat area (201 acres) would not be managed as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar, avoidance area for wind • **VRM**: Class III (176 acres), Class IV (25 acres) • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Avoid	The Pecos Bluntnose Shiner Habitat (201 acres) would be designated as an ACEC and managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar, excluded from wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Closed • **ROWs**: Exclusion area	Same as Alternative A.	Same as Alternative A except the areas would be open with major constraints for leasable development.	Same as Alternative C.

2.27.4.22 Pope's Well ACEC

2.27.4.22.1 *Relevance and Importance Values*

Historic value.

2.27.4.22.2 *Goals*

1. Protect the historic values within the Pope's Well ACEC.

2.27.4.22.3 *Objectives*

1. Limit access to historic sites to protect historic structures.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-41. Alternatives for Pope's Well ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Pope's Well Historic Site (81 acres) would not be managed as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Open • **Renewables**: Excluded from solar, avoid for wind • **VRM**: Class IV • **Travel**: Closed • **Grazing**: Closed • **ROWs**: Avoid	The Pope's Well area (81 acres) would not be designated as an ACEC, but would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • Locatables: Withdrawn • **Renewables**: Excluded from solar and wind • **VRM**: Class IV • **Travel**: Closed • **Grazing**: Closed • **ROWs**: Exclusion area	The Pope's Well ACEC (81 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Withdrawn • **Renewables**: Excluded from solar and wind • **VRM**: Class IV • **Travel**: Closed to travel • **Grazing**: Closed • **ROWs**: Exclusion area	Same as Alternative A.	Same as Alternative C.

2.27.4.23 Salt Playas ACEC

2.27.4.23.1 *Relevance and Importance Values*

Cultural value and fish or wildlife resources.

2.27.4.23.2 *Goals*

1. Protect the cultural, and fish or wildlife resource, values within the Salt Playas ACEC.

2.27.4.23.3 *Objectives*

1. Restrict surface-disturbing activities in playas to protect invertebrates, vertebrates, and birds and their habitat.
2. Protect the integrity and functionality of the hyper saline playas.
3. Protect the cultural landscape around the playas.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-42. Alternatives for Salt Playas ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Salt Playas area (49,772 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (20,360 acres), open with moderate constraints (22,713 acres), open with major constraints (3,659 acres), closed (3,040 acres) • **Salables**: Open (45,316 acres), closed (4,455 acres) • **Locatables**: Open • **Renewables**: Closed to geothermal (599 acres), excluded from solar, open to wind (27,839 acres), avoidance for wind (21,364 acres) • **VRM**: Class III (4,514 acres), Class IV (45,258 acres) • **Travel**: OHV limited (46,189 acres), closed (3,011 acres) • **Grazing**: Open • **ROWs**: Open (44,148 acres), avoid (4,455 acres) The Laguna Plata Archaeological District portion of the ACEC area would also be managed as follows: Closed to solid mineral leasing, except existing potash leases that require extensive excavation (3,360 acres) to mitigate the adverse effects to cultural resources	The Salt Playas area (49,772 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with major constraints (35,607 acres), closed (14,165 acres) • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed for geothermal, excluded from solar and wind • **VRM**: Class II (59 acres), Class III (8,105 acres) and Class IV (41,608 acres) • **Travel**: OHV limited • **Grazing**: Open (44,707 acres), closed (4,496 acres) **ROWs**: Exclude	The Salt Playas ACEC (49,772 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with major constraints (46,239 acres), closed (2,961 acres) • **Salables**: Closed (49,203 acres) • **Locatables**: Recommended for withdrawal (49,203 acres) • **Renewables**: Closed to geothermal, and excluded from solar and wind (49,203 acres) • **VRM**: Class II (59 acres), Class III (8,105 acres), Class IV (41,039 acres) • **Travel**: OHV limited • **Grazing**: Open (44,707 acres), closed (4,496 acres) • **ROWs**: Exclude	The Salt Playas area (49,772 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (20,203 acres), open with moderate constraints (22,829 acres), open with major constraints (6,740 acres) • **Salables**: Open (20,203 acres), open with special terms and conditions (22,829 acres), closed (6,740 acres) • **Locatables**: Open (45,276 acres), recommended for withdrawal (4,496 acres) • **Renewables**: Open for geothermal (1,088 acres, closed for geothermal (80 acres), variance for solar (42,386 acres) excluded from solar (6,817 acres), and open to wind (20,162 acres), avoid for wind (22,381 acres), excluded from wind (6,660 acres) • **VRM**: Class III (8,164 acres), Class IV (41,608 acres) • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open (41,787 acres), avoid (157 acres), excluded (6,660 acres)	The Salt Playas area (49,772 acres) would not be managed as an ACEC, but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (33,206 acres), open with moderate constraints (12,070 acres), open with major constraints (4,496 acres) • **Salables**: Open (33,251 acres), open with special terms and conditions (12,024 acres), closed (4,496 acres) • **Locatables**: Open (45,276 acres), recommended for withdrawal (4,496 acres) • **Renewables**: Open for geothermal (1,088 acres) and closed to geothermal (80 acres), variance for solar (42,543 acres) and excluded from solar (6,660 acres), open to wind (20,319 acres), avoidance for wind (24,388 acres), excluded from wind (4,496 acres) • **VRM**: Class III (8,164 acres), Class IV (41,608 acres) • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open (41,943 acres), avoid (2,164 acres), excluded (4,496 acres)

2.27.4.24 Serpentine Bends ACEC

2.27.4.24.1 *Relevance and Importance Values*

Fish or wildlife resources, historic value, natural system or process, and scenic value.

2.27.4.24.2 *Goals*

1. Protect the historical, scenic, fish or wildlife resource, and natural systems or process values within the Serpentine Bends ACEC.

2.27.4.24.3 *Objectives*

1. Restrict surface-disturbing activities to protect scenic values.
2. Limit access to protect guano mining sites.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-43. Alternatives for Serpentine Bends ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Serpentine Bends area (5,019 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Open (804 acres), closed (4,215 acres) • **Locatables**: Recommended for withdrawal • **Renewables**: Variance for solar (21 acres), excluded from solar (4,195 acres), avoidance area for wind (3,578 acres) and exclusion area (638 acres) for wind • **VRM**: Class I (638 acres), Class II (3,892 acres), Class III (492 acres) • **Travel**: Open (3,578 acres), closed (638 acres) • **Grazing**: Open • **ROWs**: Open (809 acres), avoid (3,407 acres), exclude (638 acres) The Serpentine Bends area proposed as an ACEC under Alternatives A–D overlaps the Mudgetts WSA. All WSA prescriptions would apply to this area under these alternatives.	The Serpentine Bends ACEC (5,019 acres) would be designated and managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed to geothermal (803 acres), excluded from solar and wind • **VRM**: Class I (638 acres), Class II (3,892 acres), Class III (492 acres) • **Travel**: OHV limited (3,578 acres), closed (638 acres) • **Grazing**: Open • **ROWs**: Exclude	Same as Alternative A, except 5,019 acres would be managed as VRM Class I.	Same as Alternative A.	Same as Alternative A.

2.27.4.25 Seven Rivers Hills ACEC

2.27.4.25.1 *Relevance and Importance Values*

Fish or wildlife resources, natural hazards, natural system or process, and scenic value.

2.27.4.25.2 *Goals*

1. Protect the scenic, fish or wildlife resource, natural system or process, and natural hazard values within the Seven Rivers Hills ACEC

2.27.4.25.3 *Objectives*

1. Limit surface-disturbing activities to protect the largest known bat roost in the planning area, critical habitat for the gypsum wild buckwheat, and fragile and scenic gypsum soils.
2. Limit access to bat roost to protect bats from white nosed syndrome.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-44. Alternatives for Seven Rivers Hills ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Seven Rivers Hills area (1,027 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (391 acres), open with major constraints (636 acres) • **Salables**: Open (505 acres), closed (522 acres) • **Locatables**: Open (505 acres), recommended for withdrawal (522 acres) • **Renewables**: Excluded from solar, avoidance area for wind • **VRM**: Class II (644 acres), Class III (56 acres), Class IV (254 acres) • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Open (432 acres), avoid (522 acres)	The Seven Rivers Hills area (1,027 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms (148 acres), NSO (387 acres), closed (492 acres) • **Salables**: Open (535 acres), closed (492 acres) • **Locatables**: Open (535 acres), recommended for withdrawal (492 acres) • **Renewables**: Open for geothermal (72 acres), variance for solar (462 acres) and excluded to solar (492 acres), open to wind (462 acres), exclusion area for wind (492 acres) • **VRM**: Class II (644 acres), Class III (129 acres), and Class IV (254 acres) • **Travel**: OHV limited • **Grazing**: Open **ROWs**: Open (462 acres), excluded (492 acres)	The Seven Rivers Hills ACEC (1,027 acres) would be designated and managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Open (72 acres), closed (955 acres) • **Locatables**: Recommended for withdrawal • **Renewables**: Open to geothermal (76 acres), excluded from solar and wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Exclusion area	Same as Alternative B except entirely closed to salables.	Same as Alternative B, except would be managed as VRM Class III.

2.27.4.26 Six Shooter ACEC

2.27.4.26.1 *Relevance and Importance Values*

Scenic, fish or wildlife resources, natural systems or processes.

2.27.4.26.2 *Goals*

1. Protect the scenic values, fish or wildlife resources, and natural systems or processes within the Six Shooter Canyon ACEC.

2.27.4.26.3 *Objectives*

1. Limit surface-disturbing activities to protect the geologic features, xeric-riparian vegetative communities, and visual resources.
2. Maintain and enhance habitat for sensitive species, species of concern, and rare plants.

Note: A map of the area can be found in Appendix K – ACECs.

Table 2-45. Alternatives for Six Shooter ACEC

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Six Shooter area (735 acres) would not be managed as an ACEC in the current plan but would be managed with the following prescriptions: • **Leasables**: Open with standard terms and conditions • **Salables**: Open • **Locatables**: Open • **Renewables**: Excluded from solar, avoid for wind • **VRM**: Class II • **Travel**: Open • **Grazing**: Open • **ROWs**: Open	The Six Shooter ACEC (735 acres) would be designated and managed with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded from solar and wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing**: Open • **ROWs**: Excluded	Same as Alternative A.	The Six Shooter area (735 acres) would not be designated as an ACEC but would be managed with the following prescriptions: • **Leasables**: Open with standard terms and conditions • **Salables**: Open with standard terms and conditions • **Locatables**: Open • **Renewables**: Excluded from solar, avoidance for wind • **VRM**: Class II • **Travel**: OHV limited • **Grazing: Open** • **ROWs:** Avoid	Same as Alternative C except salables would be open with special terms and conditions.

2.28 SPECIAL DESIGNATIONS – RESEARCH NATURAL AREAS

Table 2-46. Alternatives for South Texas Hill Canyon RNA

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The main objective of this 1,360-acre RNA is to protect and enhance this representative habitat as well as a known potential listed species in the area. This area would also provide a focus of studies and data gathering pertaining to Chihuahuan Desert Ecosystem functions for use in future management guidance. The 1,360-acre South Texas Hill Canyon RNA is designated to conduct long-term research within the Chihuahuan Desert Ecosystem. Management prescriptions for the South Texas Hill Canyon RNA include no surface disturbance and removal of livestock grazing, except where beneficial for research purposes.	RNA designation is not used in the Draft RMP/EIS. See Eastern Guadalupe Escarpment HMA.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

Table 2-47. Alternatives for Little McKittrick Draw RNA

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The main objective of this 10-acre RNA is to enhance this habitat for this species [McKittrick ramshorn snail (*Pecosorbis kansasensis*)]. This area would also provide a focus of studies and data gathering pertaining to Chihuahuan Desert Ecosystem functions for use in future management guidance. A 10-acre RNA has been designated to protect the federal candidate species ramshorn snail, which is present in Little McKittrick Draw. Stipulations providing for no surface disturbance and fencing to exclude livestock from 10 acres would protect the essential habitat in the RNA while providing research opportunities to determine biological requirements.	RNA designation is not used in the Draft RMP/EIS. Additionally, the Little McKittrick Draw RNA area was originally designated to protect the ramshorn snail. Since the designation large populations of ramshorn snails have been discovered and the species was removed from the candidate list.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

2.29 SPECIAL DESIGNATIONS – WILD AND SCENIC RIVERS

2.29.1 Goals

1. Protect the fish, wildlife, cultural, historical, paleontological, scenic, geological, and other resource values as appropriate of those rivers that are designated as part of the National Wild and Scenic River System (NWSRS).

2.29.2 Objectives

1. Maintain or enhance the outstanding remarkable values, free-flowing character, water quality, and tentative classification of designated and suitable WSR segments.
2. To the extent of the BLM's authority (limited to BLM-administered lands within the river corridor), maintain and enhance the free-flowing character, preserve and enhance the outstandingly remarkable values, and allow no activities within the river corridor that would alter the tentative classification of those river segments determined suitable for congressional designation in the NWSRS until Congress acts.

2.29.3 Management Common to All Alternatives

1. If, through legislation, Congress decides not to designate a suitable segment as part of the NWSRS, the protection management outlined in this section would no longer apply, and these segments would be managed according to direction in other sections of the RMP.

Note: See Appendix N – Wild and Scenic River Study Report for more information on proposed wild and scenic rivers in the CFO.

Table 2-48. Alternatives for Special Designations – Wild and Scenic Rivers

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Black River would be managed as a Special Management Area. The Black River would not be managed as part of the NWSRS. The river would be managed as eligible until suitability determinations area made. The area would be managed with the following prescriptions (Map 2-58): • **Leasables**: NSO • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed or excluded • **VRM**: Class III • **Travel**: OHV limited • **ROWs**: Avoid • **Grazing**: Closed	The Black River (3.67 miles/1,296 acres) would be recommended as suitable for inclusion in the NWSRS with a tentative classification of recreational river area. The Outstandingly Remarkable Values (ORVs) for this river segment are scenic, recreational, geologic, fish and wildlife, cultural and historical. The area would be managed with the following prescriptions (Map 2-59): • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **Renewables**: Excluded • **VRM**: Class II • **Travel**: OHV limited • **ROWs**: Excluded • **Grazing**: Closed	Same as Alternative A (Map 2-60).	Same as Alternative A (Map 2-61).	Same as Alternative A except managed as open with major constraints for leasable development (Map 2-62).
The Delaware would be managed as a Special Management Area. Delaware River is not managed as part of the NWSRS. The river would be managed as eligible until suitability determinations are made. The area would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Closed or excluded • **VRM**: Class II (7.3 miles, upper stretches), Class IV (1.2 miles, lower stretch) • **Travel**: Open (6.3 miles), OHV limited (2.2 miles) • **ROWs**: Avoid	Segment 1 of the Delaware River (8.22 miles/2,804 acres) would be recommended as suitable for designation in the NWSRS with a tentative classification of a scenic river area. The ORVs for this river segment are scenic, recreation, and geologic. The following management prescriptions would apply: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **Renewables**: Excluded • **VRM**: Class II • **Travel**: OHV limited • **ROWs**: Exclude	Segment 1 of the Delaware River (8.22 miles/2,804 acres) would not be recommended as suitable for inclusion in the NWSRS. The area would be managed with the following prescriptions: • **Leasables**: Open with major constraints • **Salables**: Closed • **Locatables**: Recommended for withdrawal) • **Renewables**: Avoid • **VRM**: Class III • **Travel**: OHV limited • **ROWs**: Avoid	Same as Alternative B.	Same as Alternative B.

2.30 SPECIAL DESIGNATIONS – WILDERNESS STUDY AREAS

2.30.1 Goals

1. Manage the WSAs according to the non-impairment standard until Congress either designates the WSA as wilderness or releases the WSA from wilderness study.

2.30.2 Objectives

1. Manage the WSA to prevent the establishment of new permanent facilities and prevent new surface disturbance unless an exception to the non-impairment standard is allowed as provided in Manual 6330, Management of Wilderness Study Areas (BLM 2012b).
2. Manage the following 7,086 acres of WSA in the planning area (see Maps 2.58 through 2.62):
   a. Devil's Den Canyon (297 acres).
   b. Lonesome Ridge (3,702 acres).
   c. Mudgetts (2,902 acres).
   d. McKittrick Canyon WSA (185 acres)

2.30.3 Management Common to All Alternatives

1. The WSAs would continue to be managed for multiple use under the non-impairment standard defined in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012b).
2. WSAs are closed to leasing as specified in BLM Manual 6330.
3. Existing leases in WSAs would not be reissued once they expire.
4. All WSAs would be designated and managed as VRM Class I areas, per BLM policy.

Table 2-49. Alternatives for Special Designations – Wilderness Study Areas

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The four WSAs—Lonesome Ridge, Mudgetts, Devil's Den Canyon, and McKittrick Canyon—would be managed to preserve their wilderness values according to BLM Manual 6330 and continue to manage them in that manner until Congress either designates the lands as wilderness or releases them for other uses.	Manage WSAs to preserve their wilderness values according to BLM Manual 6330 and continue to manage them in that manner until Congress either designates the lands as wilderness or releases them for other uses.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Lands making up Mudgetts WSA (2,902 acres) if released by Congress: The 1,881 acres in the cave protection zone established by the Lechuguilla Cave Protection Act of 1993 and the Dark Canyon Environmental Impact Statement would be managed according to the requirements of the Act and the EIS (Map 3-36). The remaining 1,060 acres would be open to leasing subject to the Surface Use and Occupancy Requirements, the Practices for Oil and Gas Drilling Operations in Cave and Karst Areas, and the Roswell District Conditions of Approval.	**Lands making up Mudgetts WSA (2,902 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Mudgetts with the following prescriptions • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded/closed for geothermal, solar, and wind • **VRM**: Class I • **Travel**: OHV limited • **ROWs**: Exclude	**Lands making up Mudgetts WSA (2,902 acres) if released by Congress:** • Same as Alternative A.	**Lands making up Mudgetts WSA (2,902 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Mudgetts with the following prescriptions: • Same as Alternative B, except manage as VRM Class II	**Lands making up Mudgetts WSA (2,902 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Mudgetts with the following prescriptions: • **Leasables**: Open subject to major constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded for geothermal, solar, and wind • **VRM**: Class III • **Travel**: OHV limited • **ROWs**: Avoid

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Lands making up Lonesome Ridge WSA (3,702 acres) if released by Congress: The 2,990 acres within the lonesome Ridge ACEC would be managed according to the prescriptions described in the 1988 RMP, as amended by the 1997 RMP. The remaining 515 acres would be managed according to the prescriptions for the Guadalupe Escarpment Scenic Area Zone 1 described in the 1988 RMP, as amended.	**Lands making up Lonesome Ridge WSA (3,702 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Lonesome Ridge with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommend for withdrawal • **Renewables**: Excluded for geothermal, solar, and wind • **VRM**: Class I • **Travel**: OHV limited • **ROWs**: Exclude • Geophysical exploration would conform to OHV closures • Prohibit plant and landscape rock collection permits and erect signage indicating trails, boundaries, no collecting allowed (fossils, rocks, plants, etc.) • No bolted routes, permanent anchors, or fixed hardware associated with rock-climbing activities would be allowed without written authorization from CFO • Prioritize for easement, acquisition for agency access • Reciprocity ROW agreements could be sought for private inholdings. Note: Reciprocity ROWs agreements are utilized when a private land owner controls access to a BLM parcel, and the BLM secures an easement across their property. In exchange BLM grants a ROW for access somewhere else on BLM-administered land that the private land owner may need.	**Lands making up Lonesome Ridge WSA (3,702 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Lonesome Ridge with the following prescriptions: • Leasables: Closed • Salables: Closed • Locatables: Recommend for withdrawal • Renewables: Excluded for geothermal, solar, and wind • VRM: Class I • Travel: OHV limited • ROWs: Exclude	**Lands making up Lonesome Ridge WSA (3,702 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Lonesome Ridge with the following prescriptions: • Same as Alternative A, except manage as VRM Class II	**Lands making up Lonesome Ridge WSA (3,702 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Lonesome Ridge with the following prescriptions: • **Leasables**: Open subject to major • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded for geothermal, solar, and wind • **VRM**: Class III • **Travel**: OHV limited • **ROWs**: Avoid

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Lands making up Devil's Den Canyon WSA (297 acres) if released by Congress: The entire area would be open for future leasing with no surface occupancy. Extremely steep slopes in the entire area preclude surface occupancy.	**Lands making up Devil's Den Canyon WSA (297 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Devil's Den with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal. • **Renewables**: Exclude for geothermal, solar, and wind • **VRM**: Class I • **Travel**: OHV limited • **ROWs**: Excluded	**Lands making up Devil's Den Canyon WSA (297 acres) if released by Congress:** • Same as Alternative A.	**Lands making up Devil's Den WSA (297 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Devil's Den with the following prescriptions: • Same as Alternative A except would be managed as VRM Class II	**Lands making up Devil's Den Canyon WSA (297 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage Devil's Den with the following prescriptions: • **Leasables**: Open subject to major constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Solar**: Exclude • **Wind**: Exclude • **Geothermal**: Exclude • **VRM**: Class III • **Travel**: OHV limited • **ROWs**: Avoid
Lands making up McKittrick Canyon WSA (185 acres) if released by Congress: The entire area would be open for future leasing with no surface occupancy. Extremely steep slopes in the entire area preclude surface occupancy.	**Lands making up McKittrick Canyon WSA (185 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage McKittrick with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded for geothermal, solar, and wind • **VRM**: Class I • **Travel**: OHV limited • **ROWs**: Avoid	**Lands making up McKittrick Canyon WSA (185 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage McKittrick with the following prescriptions: • **Leasables**: Closed • **Salables**: Closed • **Locatables**: Recommended for withdrawal • **Renewables**: Excluded for geothermal, solar, and wind • **VRM**: Class I • **Travel**: OHV limited • **ROWs**: Exclude	**Lands making up McKittrick Canyon WSA (185 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage McKittrick with the following prescriptions: • Same as Alternative B, except would be managed as VRM Class II	**Lands making up McKittrick WSA (185 acres) if released by Congress:** In order to maintain natural features, wildlife, visual resources, cultural values, and opportunities for semi-primitive, non-motorized recreation, the BLM would manage McKittrick with the following prescriptions: • **Leasables**: Open subject to major constraints • **Salables**: Open with special terms and conditions • **Locatables**: Open • **Renewables**: Excluded for geothermal, solar, and wind • **VRM**: Class III • **Travel**: OHV limited • **ROWs**: Avoid

2.31 SPECIAL DESIGNATIONS – WILDERNESS

Note: There are no designated wilderness areas in the planning area.

2.32 BACKCOUNTRY BYWAYS

2.32.1 Goals

1. Provide or facilitate the services of a National Backcountry Byway for public land users, including pleasure driving and backcountry safety, access to recreation lands, natural and cultural resources, interpretation, environmental education, and multiple-use information.
2. Enhance the visitor's recreation experience and communicate the BLM's multiple-use message through an effective wayside interpretive program.
3. Showcase the BLM's management activities, as well as the contributions and activities of the other public agencies and private enterprise partners.
4. Help enhance the safety of New Mexico Highway 137 to better accommodate the increasing demands of the pleasure-driving public and industrial, commercial, and other users. Increase the public awareness of the availability of pleasure driving and other recreational opportunities, as well as cultural and natural attractions in the area.
5. Contribute to local and regional economies through increased tourism.

2.32.2 Objectives

1. Develop a strategy for funding byway interpretive kiosks and other projects.
2. Install byway entrance and identification signs.
3. Establish and maintain an active byway-partners operational group that would serve as the management coordination body to promote the byway.
4. Prepare a Guadalupe Backcountry Byway informational brochure.

2.32.3 Management Common to All Alternatives

1. BLM Backcountry Byways may be designated in the future as deemed appropriate with site-specific environmental analysis.

Table 2-50. Alternatives for Backcountry Byways

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Guadalupe Backcountry Byway (55 miles) would be managed per the 1995 Byway Plan. • The designated visual corridor, or the seen area from the byway, would be managed under VRM Class II objectives • Open for leasable, salable, and locatable development • Managed as VRM Class III	The Guadalupe Backcountry Byway (55 miles) would be managed as per the 1995 Byway Plan and with the following prescriptions: • Open with moderate constraints for leasable development • Open with special terms and conditions for salable development • Open to locatable development • Managed as VRM Class II	Same as Alternative A.	The Guadalupe Backcountry Byway (55 miles) would be managed as per the 1995 Byway Plan and with the following prescriptions: • Open with standard terms and conditions for leasables • Open with standard terms and conditions for salables, • Open to locatable development • Managed as VRM III and IV	Same as Alternative C.

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The Dark Canyon Road Loop would not be designated as a BLM Backcountry Byway but would be managed with the following prescriptions: • **Leasables**: Open • **Salables**: Open • **Locatables**: Open • **VRM**: Class III and Class IV	The Dark Canyon Road Loop (9.5 miles) (Map 2-59) would be designated as a BLM Backcountry Byway and managed with the same prescriptions as the Guadalupe Backcountry Byway. • **Leasables**: Open subject to moderate constraints, with the most limiting constraint being VRM Class II (within the 2-mile buffer) • **Salables:** Open with special terms and conditions • **Renewables**: Excluded to all • **Travel**: OHV limited • **VRM**: Class II within a 2-mile buffer from either side of the road Open to **salables**, **locatables**, and **ROWs** as long as those permitted uses are shown to be compatible with the VRM class under a site-specific analysis.	Same as Alternative A.	The Dark Canyon Road Loop would not be designated as a BLM Backcountry Byway but would be managed with the same prescriptions as the Guadalupe Backcountry Byway. • **Leasables**: Open subject to moderate constraints, with the most limiting constraint being the VRM II (within the 0.25-mile buffer) class • **VRM**: Class II within a 0.25-mile buffer from either side of the road • **Travel:** OHV limited • **Renewables:** Excluded within the VRM II management class area Open to **salables, locatables, and ROWs** as long as those permitted uses are shown to be compatible with the VRM class under a site-specific analysis	The Dark Canyon Road Loop would not be designated as a BLM Backcountry Byway but would be managed as VRM Class III within a 1-mile buffer from either side of the road. • **Leasables:** would be managed open, with the most limiting constraint being VRM Class III (within the 1-mile buffer) • **Renewables**: Excluded within the VRM III management class area Open to **salables, locatables, and ROWs** as long as those permitted uses are shown to be compatible with the VRM class under a site-specific analysis.

2.33 HEALTH AND SAFETY

2.33.1 Goals

1. Ensure health and safety concerns on public lands remain a high priority.

2.33.2 Objectives

1. Mitigate issues related to health and safety on public lands.

2.33.3 Management Common to All Alternatives

1. Ensure that health and safety of the public, stakeholders, visitors, employees, contractors, and volunteers are a priority in all alternatives.
2. Identify and mitigate health and safety concerns in accordance with applicable federal, state, and local regulations as well as lease and permit terms, Onshore Oil and Gas Orders, Notice to Lessees (NT's), and other orders and instructions of the authorized officer that protect health and safety.
3. Ensure compliance with the Clean Air Act, Safe Drinking Water Act, Clean Water Act, and other applicable federal laws.
4. Comply with procedures in the Department of the Interior (DOI) Occupational Safety and Health Program Field Manual; DOI Safety and Health Handbook 485 DM; BLM Manual 1112 Safety; the Occupational Safety and Health Administration (OSHA) Act; and other applicable safety and occupational health standards and directives that are issued by Federal agencies other than OSHA, such as the Nuclear Regulatory Commission, Department of Transportation, and the Federal Communications Commission.
5. Utilize the Safety Management Information System database to document accidents and injuries to employees, contractors, and volunteers.

2.34 HAZARDOUS MATERIALS

2.34.1 Goals

1. Ensure waste and hazardous materials concerns on public lands remain a high priority.

2.34.2 Objectives

1. Mitigate issues related to waste and hazardous materials.

2.34.3 Management Common to All Alternatives

1. Comply with procedures in the BLM Manual 1703 Hazard Management and Resources Restoration Policy and other applicable BLM policies and regulations.
2. Hazardous materials related to active mining are regulated by the Mining Safety and Health Administration (PL 91-173, Federal Mine Safety & Health Act of 1977); otherwise, storage and use of hazardous materials on public lands would not be allowed without BLM authorization.
3. Ensure compliance with the Clean Air Act, Safe Drinking Water Act, Clean Water Act, and other applicable federal laws.
4. Use applicable laws, regulations, law enforcement, stakeholder partnership, and public outreach to discourage the unauthorized disposal of waste and hazardous waste on public lands.
5. Responses to hazardous materials incidents and sites would be as outlined and approved by the contingency plans for hazardous materials incidents.
6. Identify and mitigate unauthorized dumping sites and hazardous materials spills in accordance with applicable federal, state, and local regulations.
7. Develop interagency agreements with local law enforcement agencies and other government agencies to facilitate the enforcement of illegal dumping and hazardous material laws.
8. Coordinate with local, state, and federal government agencies during hazardous materials prevention and response activities.
9. Develop public outreach and educational materials in coordination with other agencies, stakeholders, and public partners to discourage the disposal of unauthorized waste on public lands.

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2.35 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.35.1 No Grazing Alternative

The BLM considered, but did not analyze in detail, an alternative that would make all 2.1 million acres of public land in the planning area unavailable for livestock grazing. The BLM did not analyze this alternative in detail because such an alternative is not reasonable, viable, or necessary in light of resource conditions and in light of the BLM's consideration of a range of alternatives that includes a meaningful reduction in livestock grazing. The NEPA requires that agencies study, develop, and describe appropriate alternatives to a recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources. During public scoping, livestock grazing was identified as an issue as it pertains to land health and riparian areas. During internal scoping, potential resource conflicts between livestock grazing and riparian resources, wildlife resources, and special status species were identified. These resource conflicts were addressed by varying management decisions for these resources across alternatives. The elimination of livestock grazing on all BLM lands in the planning area was not identified as a potential management decision that would resolve these resource conflicts.

A range of livestock grazing alternatives was defined in two ways: First, under Alternative A, livestock grazing would be reduced by 493,120 acres (approximately 24% of federal surface in the planning area) to protect watershed health. This would preclude resource conflicts between livestock grazing and other resources in these areas. The areas unavailable to grazing under Alternative A are within proposed ACECs, at riparian areas, and in and near springs. Second, under Alternatives B, C, and D, variable grazing levels would be allowed via adaptive management according to the New Mexico Standards and Guidelines (BLM 2001c). Management prescriptions for each allotment or pasture would depend on the current condition of the area, and management would be adjusted in response to the findings of periodic monitoring. Adaptive management of allotments that do not meet the *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management, Record of Decision* (BLM 2001) might include reducing AUMs, rotating grazing, prescribing rest periods, varying the duration or timing of grazing, adding or relocating water developments, or eliminating grazing in certain areas. The appropriate adaptive management prescription for each allotment is determined in site-specific environmental analyses, such as grazing permit renewal EAs. Through adaptive management, a range of allowable livestock grazing acres and AUMs could be reached under Alternatives B, C, and D.

In accordance with BLM's *Land Use Planning Handbook* (BLM 2005) and national policy, the CFO considered a range of alternatives that contain areas available and unavailable for livestock grazing and the amount of forage allocated to livestock on an area-wide basis. The range of alternatives carried forward for detailed analysis includes a meaningful reduction in livestock grazing, both through reduction in areas available to livestock grazing as well as forage allocation. The CFO developed a range of alternatives that defines the issues and provides a clear basis for choice among options by the decision-maker. A no grazing alternative is not carried forward for detailed analysis.

2.35.2 Social Cost of Carbon

A protocol to estimate what is referenced as the "social cost of carbon" (SCC) associated with GHG emissions was developed by a federal Interagency Working Group (IWG), to assist agencies in addressing Executive Order (EO) 12866, which requires federal agencies to assess the cost and the benefits of proposed regulations as part of their regulatory impact analyses. The SCC is an estimate of the economic damages associated with an increase in carbon dioxide emissions and is intended to be used as part of a cost-benefit analysis for proposed rules. As explained in the Executive Summary of the 2010 SCC Technical Support Document "the purpose of the [SCC] estimates…is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that have small, or 'marginal,' impacts on cumulative global emissions." Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 February 2010 (withdrawn by EO13783). The SCC protocol was thus created to meet the requirements for regulatory impact analyses during rulemakings.

The decision was made not to expand the use of the SCC protocol for this RMP for a number of reasons. Most notably, this action is not a rulemaking for which the SCC protocol was originally developed. Second, on March 28, 2017, the President issued Executive Order 13783 which, among other actions, withdrew the Technical Support Documents upon which the protocol was based and disbanded the earlier Interagency Working Group on Social Cost of Greenhouse Gases. The Order further directed agencies to ensure that estimates of the social cost of greenhouse gases used in regulatory analyses "are based on the best available science and economics" and are consistent with the guidance contained in OMB Circular A-4, "including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates" (E.O. 13783, Section 5(c)). In compliance with OMB Circular A-4, interim protocols have been developed for use in the rulemaking context. However, the Circular does not apply to project decisions, so there is no Executive Order requirement to apply the SCC protocol to project decisions.

Further, the National Environmental Policy Act (NEPA) does not require a cost-benefit analysis (40 C.F.R. § 1502.23), although NEPA does require consideration of "effects" that include "economic" and "social" effects. 40 C.F.R. 1508.8(b). Without a complete monetary cost-benefit analysis, which would include the social benefits of the proposed action to society as a whole and other potential positive benefits, inclusion solely of an SCC cost analysis would be unbalanced, potentially inaccurate, and not useful in facilitating an authorized officer's decision. Any increased economic activity, in terms of revenue, employment, labor income, total value added, and output, that is expected to occur with the proposed action is simply an economic impact, rather than an economic benefit, inasmuch as such impacts might be viewed by another person as negative or undesirable impacts due to potential increase in local population, competition for jobs, and concerns that changes in population would change the quality of the local community. Economic impact is distinct from "economic benefit" as defined in economic theory and methodology, and the socioeconomic impact analysis required under NEPA is distinct from cost-benefit analysis, which is not required.

Finally, the SCC, protocol does not measure the actual incremental impacts of a project on the environment and does not include all damages or benefits from carbon emissions. The SCC protocol estimates economic damages associated with an increase in carbon dioxide emissions - typically expressed as a one metric ton increase in a single year - and includes, but is not limited to, potential changes in net agricultural productivity, human health, and property damages from increased flood risk over hundreds of years. The estimate is developed by aggregating results "across models, over time, across regions and impact categories, and across 150,000 scenarios" (Rose et al. 2014). The dollar cost figure arrived at based on the SCC calculation represents the value of damages avoided if, ultimately, there is no increase in carbon emissions. But the dollar cost figure is generated in a range and provides little benefit in assisting the BLM's decision for project level analyses.

To summarize, SCC is not undertaken in this analysis because 1) it is not engaged in a rulemaking for which the protocol was originally developed; 2) the IWG, technical supporting documents, and associated guidance have been withdrawn; 3) NEPA does not require cost-benefit analysis; and 4) the full social benefits of carbon-based energy production have not been monetized, and quantifying only the costs of GHG emissions but not the benefits would yield information that is both potentially inaccurate and not useful.

2.36 SUMMARY OF IMPACTS

2.36.1 Summary of Impacts to Soil and Water Resources

Resource	Impacts from Management Common to All
Soil Resources	There are no soil resource management actions common to all alternatives that would impact soil and water resources.
Water Resources	There are no water resource management actions common to all alternatives that would impact soil and water resources.
Karst Resources	There are no karst management actions common to all alternatives that would impact soil and water resources.
Special Status Species	There are no special status species management actions common to all alternatives that would impact soil and water resources.
Vegetation	There are no vegetation management actions common to all alternatives that would impact soil and water resources.
Wildland Fire Management	There are no wildland fire management actions common to all alternatives that would impact soil and water resources.
Land Use Authorizations	There are no land use authorizations management actions common to all alternatives that would impact soil and water resources.
Livestock Grazing	There are no livestock grazing management actions common to all alternatives that would impact soil and water resources.
Travel Management and Recreation	Management decisions would include the following; the Phantom Banks Heronries would be designated as OHV limited, motorized wheeled cross-country travel would be allowed for any military, fire, search and rescue, or law enforcement vehicle used for emergency purposes and motorized wheeled cross-country travel for leases and permittees would be limited to the administration of a BLM lease or permit. These actions would minimize adverse impacts to both soil and water resources.
Special Designations	7,086 acres would remain under WSA designation. Management prescriptions under WSA designation include closure to mineral development leasing. This would minimize potential adverse impacts to soil and water resources associated with ground disturbances.
Mineral Resources	There are no mineral resource management actions common to all alternatives that would impact soil and water resources.
Renewable Energy	All management common to all decisions would potentially provide some beneficial impacts to soil and water resources that are within lesser prairie-chicken and/or dunes sagebrush lizard habitat, as all applications to permit either solar or wind energy sites across the planning area would require the demonstration that proposed projects would not adversely impact these species' habitats.
Visual Resources	There are no proposed management decisions common to all alternatives that would impact soil and water resources.

Resource	Impacts from Management Common to All Action Alternatives
Soil Resources	There are no proposed soil management actions listed under management common to all action alternatives.
Water Resources	There are no proposed water resource management actions listed under management common to all action alternatives.
Karst Resources	There are no proposed karst resource management actions listed under management common to all action alternatives.
Special Status Species	There are no proposed special status species management actions listed under management common to all action alternatives.
Vegetation	There are no proposed vegetation management actions listed under management common to all action alternatives.
Wildland Fire Management	There are no proposed wildland fire management actions listed under management common to all action alternatives.
Land Use Authorizations	All projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level. The degree of impact on soils and water would vary, depending on the project, its location, and the soil composition of the area.
Livestock Grazing	The number of livestock and season of use within the Pecos River area would be established on an allotment basis in order to ensure adequate growing season rest within riparian pastures. Riparian springs and their associated riparian zones would be closed to grazing. Both of these proposed management actions would minimize adverse impacts to soil and water resources.
Travel Management and Recreation	Proposed management actions would minimize adverse impacts to soil and water resources, such as soil compaction and erosion, contamination, and overall reduction in soil productivity and water quality
Special Designations	3.7 miles the Black River would be recommended as suitable for inclusion in the National Wild and Scenic River System. Management prescriptions associated with the designated WSR segment would beneficially impact soil and water resources because potential adverse impacts, such as increased sedimentation and turbidity, decreased stream vegetation, and water quality alterations, would be minimized.
Mineral Resources	There are no proposed mineral resource management actions listed under management common to all action alternatives.
Renewable Energy	Impacts from management decisions common to all action alternatives would include the exclusion of wind, solar, and geothermal development in areas that are within known karst areas. All action alternatives encourage the placement of wind development projects in areas where transmission corridors are already located and where transmission systems are already in place. Adverse impacts to soil and water resources would be minimized in these areas.
Visual Resources	There are no proposed management decisions listed under management common to all action alternatives.

2.36.2 Land Use Authorizations

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. Adverse impacts to soil and water would occur in these corridors where surface disturbance would be permitted.	Same as No Action Alternative except 798,544 acres would be open to utility ROW grants.	Same as No Action Alternative except 757,380 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,610,692 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,749,782 acres would be open to utility ROW grants.

2.36.3 Livestock Grazing

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
2,086,107 acres would be open to livestock grazing. 5,226 acres would be closed to grazing. Alternatives that reduce the total number of acres open for grazing would be the most beneficial to soil and water resources. Negative impacts from grazing, however, can be mitigated through the use of grazing season deferment and by following grazing management plans and other planning documents such as the Standards and Guidelines (BLM 2001).	The same impacts as the No Action Alternative except 1,598,198 acres would be open to livestock grazing.	The same impacts as the No Action Alternative except 1,937,725 acres would be open to livestock grazing.	The same impacts as the No Action Alternative except 2,083,232 acres would be open to livestock grazing.	The same impacts as the No Action Alternative except 2,087,759 acres would be open to livestock grazing.

2.36.4 Travel Management and Recreation

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Beneficial impacts from OHV limited travel on 2,035,307 acres and closed on 55,966 acres. Travel management and recreation would have the potential to adversely impact soil and water resources wherever OHVs operate and wherever recreation activities are not managed. Approximately 68,194 acres of SRMAs would help limit adverse impacts to soils and water resources (no ERMAs designated). Management actions regarding campfires, firewood gathering, and equestrian activities would remain unchanged from the 1988 RMP. Thus, impacts to soil and water resources from these recreational activities would be a continuation of the trends under existing conditions.	Impacts would be more beneficial as compared to the No Action Alternative. Approximately 52,028 acres would be closed to travel, and the remainder of the planning area (2,039,299 acres) would be OHV limited until a travel plan is completed. Approximately 49,991 acres of SRMAs and 2,975 of ERMAs would be designated, which would help limit adverse impacts to soil and water resources.	Impacts would be more beneficial as compared to the No Action Alternative. Approximately 41,936 acres would be closed to travel, and the remainder of the planning area (2,049,391 acres) would be OHV limited until a travel plan is completed. Approximately 49,988 acres of SRMAs and 26,564 acres of ERMAs would be designated, which would help limit adverse impacts to soil and water resources.	Impacts would be more be beneficial as compared to the No Action Alternative. Approximately 38,738 acres would be closed to travel, and the remainder of the planning area (2,052,582 acres) would be OHV limited until a travel plan is completed. Approximately 49,669 acres of SRMAs and 17,302 acres of ERMAs would be designated, which would help limit adverse impacts to soil and water resources.	Impacts would be less beneficial as compared to the No Action Alternative. Approximately 38,737 acres would be closed to travel, (less than the No Action Alternative), and the remainder of the planning area (2,052,584 acres) would be OHV limited until a travel plan is completed. Approximately 49,673 acres of SRMAs and 9,456 acres of ERMAs would be designated, which would help limit adverse impacts to soil and water resources.

2.36.5 Special Designations

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
13,435 acres would be designated as ACECs, which would have a beneficial impact to soil and water resources by minimizing the amount of surface disturbance allowed in these areas. The Black River and Delaware River would not be managed as part of National Wild and Scenic River System and would remain under management prescriptions already in place.	495,042 acres would be designated as ACECs, which would have a beneficial impact to soil and water resources by minimizing the amount of surface disturbance allowed in these areas. One segment (8.22 miles) of the Delaware River would be recommended as suitable for WSR designation. The Black River would also be recommended as suitable for WSR designation.	561,441 acres would be designated as ACECs, which would have a beneficial impact to soil and water resources by minimizing the amount of surface disturbance allowed in these areas. The Delaware River would not be recommended as suitable for inclusion in the WSR system; however, management prescriptions would be similar to those described under the No Action Alternative. The Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A.	98,562 acres would be designated as ACECs, which would have a beneficial impact to soil and water resources by minimizing the amount of surface disturbance allowed in these areas. The Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A. The Delaware River would not be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative B.	28,894 acres would be designated as ACECs, which would have a beneficial impact to soil and water resources by minimizing the amount of surface disturbance allowed in these areas. The Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A, except the area would be managed as open with major constraints (NSO) for leasable development. The Delaware River would not be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative B.

2.36.6 Mineral Resources

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
5,874 wells and 8,636 acres of surface disturbance are predicted after reclamation and 38,811 acre-feet of water use on BLM surface and subsurface lands (split estate). Adverse impacts to soil and water resources, as those described in Chapter 4, would be expected to continue if the No Action Alternative is adopted.	4,465 wells and 6,565 acres of surface disturbance are predicted after reclamation on BLM-administered surface and subsurface lands. Total predicted water use would be 29,503 acre-feet. Compared to the No Action Alternative, the magnitude of adverse impacts to soil and water resources would be greater under the No Action Alternative than under Alternative A.	3,538 wells and 5,202 acres of surface disturbance are predicted after reclamation on BLM-administered surface and subsurface lands. Total predicted water use would be 23,379 acre-feet. The magnitude of adverse impacts to soil and water resources would be greater under the No Action Alternative than under Alternative B.	5,832 wells and 8,575 acres of surface disturbance are predicted on BLM-administered surface and subsurface lands. Total predicted water use would be 38,538 acre-feet. The magnitude of adverse impacts to soil and water resources would be greater under the No Action Alternative than under Alternative C.	6,044 wells and 8,887 acres of surface disturbance are predicted on BLM-administered surface and subsurface lands. Total predicted water use would be 39,937 acre-feet. The acres of surface disturbance are 170 acres greater under this alternative than the No Action Alternative. Predicted water use is also slightly greater under this alternative compared to the No Action Alternative; therefore, the magnitude of adverse impacts to soil and water resources would be greater under Alternative D compared to the No Action Alternative.

2.36.7 Renewable Energy

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
The BLM would exclude 1,820,409 acres from geothermal and solar development projects and 7,056 acres from wind development projects. Restrictions on the location of solar or wind energy sites would continue to be implemented on specific sites across the planning area, with the majority of the planning area excluded for solar development, as identified by the Solar Energy Development Programmatic EIS ROD (BLM 2012). Management prescriptions would benefit soil and water resources by minimizing surface disturbance and its associated adverse impacts	The BLM would exclude approximately 654,000 acres from wind, 768,020 acres from solar, and 220,957 acres from geothermal development. Solar, wind, and geothermal development would be excluded in areas with sensitive soils, not only in SMAs as is the case under the No Action Alternative. Compared to the No Action Alternative, the magnitude of beneficial impacts to soil and water resources would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative.	The BLM would close or exclude approximately 912,860 acres from wind development, 833,305 acres from solar, and 285,384 acres from geothermal development. Approximately 418,812 acres would be designated as avoidance area for wind development.	The BLM would exclude approximately 206,184 acres from wind development, 734,636 acres from solar, and 129,750 acres from geothermal development. Approximately 883,051 acres would be designated as avoidance area for wind development. Compared to the No Action Alternative, the magnitude of beneficial impacts to soil and water resources would be potentially greater because all sensitive soils would be avoided, and wind development would be prohibited on a substantially larger number of acres under this alternative.	The BLM would exclude 73,143 acres from wind development. Approximately 630,302 acres would be excluded from solar development and 122,462 acres closed to geothermal development. Approximately 926,749 acres would be designated as avoidance area for wind development. Compared to the No Action Alternative, the magnitude of beneficial impacts to soil and water resources would be potentially greater because all sensitive soils would be avoided, and wind development would be prohibited on a substantially larger number of acres under this alternative.

2.36.8 Visual Resources

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Management objectives for VRM Classes 1 and II would provide the greatest benefits to soil and water resources by minimizing surface disturbance in those areas. A combined 50,671 acres would be managed as VRM Classes I and II.	Same as No Action Alternative, except 273,710 acres would be managed as VRM Classes I and II.	Same as No Action Alternative, except 357,802 acres would be managed as VRM Classes I and II.	Same as No Action Alternative, except 67,962 acres would be managed as VRM Classes I and II.	Same as No Action Alternative, except 48,263 acres would be managed as VRM Classes I and II.

2.36.9 Summary of Impacts to Karst Resources

Resource	Impacts from Management Common to All
Karst Resources Actions	There are no proposed decisions that would impact karst resources.
Fish and Wildlife Actions	There are no proposed decisions that would impact karst resources.
Lands with Wilderness Characteristics Actions	There are no proposed decisions that would impact karst resources.
Paleontological and Cultural Resources Actions	There are no proposed decisions that would impact karst resources.
Upland Vegetation Actions	There are no proposed decisions that would impact karst resources.
Noxious Weed Management Actions	There are no proposed decisions that would impact karst resources.
Soil Resources Actions	There are no proposed decisions that would impact karst resources.
Wildland Fires and Fuels Management Actions	There are no proposed decisions that would impact karst resources.
Livestock Grazing Actions	There are no proposed decisions that would impact karst resources.
Recreation Actions	There are no proposed decisions that would impact karst resources.
Travel Management Actions	There are no proposed decisions that would impact karst resources.
Land Use Authorization Actions	There are no proposed decisions that would impact karst resources.
Water/Riparian Actions	There are no proposed decisions that would impact karst resources.
Renewable Energy Actions	There are no proposed decisions that would impact karst resources.
Minerals Development Actions	There are no proposed decisions that would impact karst resources.
Special Designation Actions	There would be long-term and short-term beneficial impacts to karst resources within four designated WSAs that have management prescriptions that minimize surface disturbances.
Visual Resources Actions	There are no proposed decisions that would impact karst resources.

Resource	Impacts from Management Common to All Action Alternatives
Karst Resources Actions	There are no proposed decisions that would impact karst resources.
Fish and Wildlife Actions	There are no proposed decisions that would impact karst resources.
Lands with Wilderness Characteristics Actions	Long-term beneficial impacts to karst resources within LWC lands as a result of management prescriptions that would minimize surface disturbance.
Paleontological and Cultural Resources Actions	There are no proposed decisions that would impact karst resources.

Resource	Impacts from Management Common to All Action Alternatives
Upland Vegetation Actions	There are no proposed decisions that would impact karst resources.
Noxious Weeds Management Actions	There are no proposed decisions that would impact karst resources.
Soil Resources Actions	There are no proposed decisions that would impact karst resources.
Wildland Fires and Fuels Management Actions	There are no proposed decisions that would impact karst resources.
Livestock Grazing Actions	There are no proposed decisions that would impact karst resources.
Recreation Actions	Long-term direct and indirect beneficial impacts as a result of Cave Resources SRMA converted to ACEC designation. Potential direct and indirect adverse impacts to SRMAs and ERMAs containing karst-dense landscapes.
Travel Management Actions	There are no proposed decisions that would impact karst resources.
Land Use Authorization Actions	Potential adverse impacts as a result of 182,536 acres designated as ROW corridors. Impacts would vary depending on particular ROW projects, their locations, and the karst composition of the area.
Water/Riparian Actions	There are no proposed decisions that would impact karst resources.
Renewable Energy Actions	Direct beneficial impacts as a result of the prohibition of energy development projects within known karst areas.
Minerals Development Actions	There are no proposed decisions that would impact karst resources.
Special Designation Actions	Long-term and short-term beneficial impacts to karst resources within four designated WSAs and within designated Caves Resource ACEC, all of which have management prescription that minimize surface disturbances.
Visual Resources Actions	There are no proposed decisions that would impact karst resources.

2.36.10 Lands with Wilderness Characteristics Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Potential adverse impacts, as no lands would be designated as LWC and surface disturbances would not be prohibited.	Direct beneficial impacts as 66,566 LWC acres in high and medium karst potential occurrence areas would be protected from surface disturbance.	Direct beneficial impacts as approximately 47,511 LWC acres in high and medium karst potential occurrence areas would be protected from surface disturbance.	Direct beneficial impacts as approximately 35,677 LWC acres in high and medium karst potential occurrence areas would be protected from surface disturbance.	Approximately 4,311 LWC acres in high and medium karst potential occurrence areas. Potential adverse impacts, as only 1,212 acres would be designated as LWC lands that would be managed to protect wilderness characteristics.

2.36.11 Paleontological and Cultural Resources Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
No impact from proposed decisions.	Same as the No Action Alternative	Same as the No Action Alternative	Same as the No Action Alternative	Same as the No Action Alternative

2.36.12 Upland Vegetation Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
No impact from proposed decisions.	Same as the No Action Alternative	Same as the No Action Alternative	Same as the No Action Alternative	Same as the No Action Alternative

2.36.13 Livestock Grazing Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct and indirect adverse impacts to karst resources as a result of 1,358,862 acres across areas of high and medium karst potential occurrence open to livestock grazing.	Direct and indirect adverse impacts to karst resources as a result of 893,327 acres across areas of high and medium karst potential occurrence open to livestock grazing.	Direct and indirect adverse impacts to karst resources as a result of 1,214,157 acres across areas of high and medium karst potential occurrence open to livestock grazing.	Direct and indirect adverse impacts to karst resources as a result of 1,354,170 acres across areas of high and medium karst potential occurrence open to livestock grazing.	Direct and indirect adverse impacts to karst resources as a result of 1,358,684 acres across areas of high and medium karst potential occurrence open to livestock grazing.

2.36.14 Recreation Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
8,626 acres would remain under Cave Resources SRMA designation; Beneficial impacts to karst resources in areas within the SRMA that prohibit surface disturbances.	No impact to karst resources as a result of proposed recreation decisions.	Same as Alternative A	Same as Alternative A	Same as Alternative A

2.36.15 Travel Management Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct and indirect beneficial impacts to karst resources because 0 acre within areas of high and medium karst potential occurrence would be open to OHV travel, 1,351,177 acres would be OHV limited, and 9,637 acres would be closed.	Direct and indirect beneficial impacts to karst resources because 0 acre within areas of high and medium karst potential occurrence would be open to OHV travel, 1,351,372 acres would be OHV limited, and 9,450 acres would be closed.	Same as Alternative A	Direct and indirect beneficial impacts to karst resources because 0 acre within areas of high and medium karst potential occurrence would be open to OHV travel, 1,352,264 acres would be OHV limited, and 8,555 acres would be closed.	Same as Alternative C.

2.36.16 Land Use Authorization Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct beneficial impacts for karst resources within the Cave Resources SRMA that would be designated as a ROW avoidance or exclusion area.	Direct beneficial impacts to karst resources within gypsum soils that would be designated as a ROW avoidance area.	Same as Alternative A	Same as Alternative A	Potential for direct adverse impacts resulting from more lenient management prescriptions pertaining to ROW development.

2.36.17 Renewable Energy Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct beneficial impacts within approximately 1,820,409 acres excluded from energy development projects.	No proposed actions would impact karst resources.	No proposed actions would impact karst resources.	No proposed actions would impact karst resources.	No proposed actions would impact karst resources.

2.36.18 Minerals Development Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
6,794 acres of surface disturbance and 3,466 wells predicted across areas of high and medium karst potential occurrence;	5,164 acres of surface disturbance and 2,634 wells predicted across areas of high and medium karst potential occurrence;	4,092 acres of surface disturbance and 2,087 wells predicted across areas of high and medium karst potential occurrence; Potential for direct	6,746 acres of surface disturbance and 3,441 wells predicted across areas of high and medium karst potential occurrence; Potential for	6,991 acres of surface disturbance and 3,566 wells predicted across areas of high and medium karst potential occurrence; Potential for direct

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Potential for direct and indirect adverse impacts to karst resources would continue across these areas. Areas of high and medium karst potential occurrence would benefit from 85,842 acres designated as open with major constraints or closed leasing categories that are excluded from surface disturbance. Areas of high and medium karst potential occurrence would benefit from 85,984 acres designated as closed or as avoidance areas for salable mineral development. Areas of high and medium karst potential occurrence would benefit from 38,849 acres recommended from withdrawal for locatable mineral development. Potential for direct and adverse impacts to karst resources would occur on 1,322,539 acres of high and medium karst potential occurrence that would be open to locatable mineral development.	Potential for direct and indirect adverse impacts to karst resources would continue across these areas. Areas of high and medium karst potential occurrence would benefit from 656,026 acres designated as open with major constraints or closed leasing categories that are excluded from surface disturbance. Areas of high and medium karst potential occurrence would benefit from 794,919 acres designated as closed or as avoidance areas for salable mineral development. Areas of high and medium karst potential occurrence would benefit from 237,603 acres recommended from withdrawal for locatable mineral development. Potential for direct and adverse impacts to karst resources would occur on 1,297,446 acres of high and medium karst potential occurrence that would be open to locatable mineral development.	and indirect adverse impacts to karst resources would continue across these areas. Alternative B has the least amount of predicted wells and surface disturbance. Areas of high and medium karst potential occurrence would benefit from 706,110 acres designated as open with major constraints or closed leasing categories that are excluded from surface disturbance. Areas of high and medium karst potential occurrence would benefit from 833,630 acres designated as closed or as avoidance areas for salable mineral development. Areas of high and medium karst potential occurrence would benefit from 255,125 acres recommended from withdrawal for locatable mineral development. Potential for direct and adverse impacts to karst resources would occur on 1,379,917 acres of high and medium karst potential occurrence that would be open to locatable mineral development.	direct and indirect adverse impacts to karst resources would continue across these areas. Areas of high and medium karst potential occurrence would benefit from 103,796 acres designated as open with major constraints or closed leasing categories that are excluded from surface disturbance. Areas of high and medium karst potential occurrence would benefit from 387,624 acres designated as closed or as avoidance areas for salable mineral development. Areas of high and medium karst potential occurrence would benefit from 71,445 acres recommended from withdrawal for locatable mineral development. Potential for direct and adverse impacts to karst resources would occur on 1,563,593 acres of high and medium karst potential occurrence that would be open to locatable mineral development.	and indirect adverse impacts to karst resources would continue across these areas. Alternative D has the greatest amount of predicted wells and surface disturbance, slightly higher than the No Action Alternative. Areas of high and medium karst potential occurrence would benefit from 96,238 acres designated as open with major constraints or closed leasing categories that are excluded from surface disturbance. Areas of high and medium karst potential occurrence would benefit from 243,712 acres designated as closed or as avoidance areas for salable mineral development. Areas of high and medium karst potential occurrence would benefit from 63,851 acres recommended from withdrawal for locatable mineral development. Potential for direct and adverse impacts to karst resources would occur on 1,571,203 acres of high and medium karst potential occurrence that would be open to locatable mineral development.

2.36.19 Special Designation Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
WSAs would continue under current designation and would minimize adverse impacts to karst resources through restrictions on surface-disturbing activities.	Direct and indirect beneficial impacts resulting from 131,080 acres containing relevant and important karst features designated as ACECs; If WSA designation is removed, four previously designated WSAs would be managed to minimize surface disturbance.	Direct and indirect beneficial impacts resulting from 89,235 acres containing relevant and important karst features designated as ACECs; If WSA designation is removed, four previously designated WSAs would be managed to minimize surface disturbance.	Direct and indirect beneficial impacts resulting from 89,227 acres containing relevant and important karst features designated as ACECs; If WSA designation is removed, four previously designated WSAs would be managed to minimize surface disturbance.	Direct and indirect beneficial impacts resulting from 23,600 acres containing relevant and important karst features designated as ACECs; potential for adverse impact would occur as a result of less stringent surface disturbance management prescriptions on WSA lands.

2.36.20 Visual Resources Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct beneficial impacts as a result of 51,403 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct beneficial impacts as a result of 273,710 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct beneficial impacts as a result of 357,802 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct beneficial impacts as a result of 67,962 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct beneficial impacts as a result of 48,263 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.

2.37 SUMMARY OF IMPACTS TO UPLAND VEGETATION AND NOXIOUS WEED MANAGEMENT

Resource	Impacts from Management Common to All
Upland Vegetation/Noxious Weed Management Actions	Long-term beneficial impacts to non-target vegetation from vegetation management, including the movement of plant communities toward the DPC and attaining other ecological objectives.
Soil Resources Actions	Beneficial impact to upland vegetation resources and noxious weed management from BMPs designed specifically to prevent soil erosion and runoff, including special site-specific seed mixtures, the removal of caliche and other surface materials, soil amendments, soil treatments, and the planting of trees and shrubs.
Karst Resources Actions	No impact; no proposed decisions that would impact upland vegetation and noxious weed management.

Resource	Impacts from Management Common to All
Special Status Species Actions	Benefit to vegetation through limitations on surface-disturbing activities and herbicide use stipulations.
Riparian/Water Resource Actions	Management actions to reduce adverse impacts to riparian areas provide indirect beneficial impacts to upland vegetation and noxious weeds management.
Wildland Fire and Fuels Management Actions	Reduction of forest stand densities would enhance other vegetation by opening habitat and resources for herbaceous understory vegetation and increasing the canopy cover, density, and species diversity of understory vegetation, and would increase the potential for forested upland vegetation communities to trend toward and achieve DPC status.
Livestock Grazing Actions	Grazing restrictions would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Vegetation treatments would also be conducted as part of rangeland improvements, which would reduce the spread of noxious weeds and invasive plants in upland vegetation.
Land Use Authorization Actions	Land use authorizations would result in surface disturbances, which could result in direct loss of vegetation and topsoil, reduced plant diversity, habitat fragmentation, soil compaction, and increased erosion and increased likelihood of noxious weed invasion. Additional impacts to soils and native vegetation would be perpetuated over time by maintenance activities for those features, although mitigation and BMPs in place would help alleviate adverse impacts. Potential adverse impacts as a result of 184,201 acres designated as ROW corridors. Impacts would vary depending on particular ROW projects, their locations and plant composition of the area. New surface disturbance in dune complexes would not be authorized within DSL habitat. By reducing surface-disturbing activities in DSL habitat, plant community composition would remain intact, and the potential for the spread of noxious weeds and invasive plants would be reduced.
Travel/Recreation Management Actions	Management prescriptions within various SRMAs, ERMAs, and RMZs would minimize surface disturbances and help limit the potential for impacts to upland vegetation caused by OHVs, such as crushing and the spread of noxious weeds and invasive plants, and result in direct and indirect beneficial impacts.
Special Designations Actions	Long-term and short-term beneficial impacts to upland vegetation within four designated WSAs that have management prescription that minimize surface disturbances.
Lands with Wilderness Characteristics Actions	No impact; no proposed decisions that would impact upland vegetation and noxious weed management.
Fish and Wildlife Actions	Benefit to plant communities within areas managed specifically for habitat improvement. Upland vegetation resources may also receive some benefits from a 1,312-foot buffer prohibiting surface-disturbing activity if located near trees with active raptors nests.
Minerals Development Actions	Development of public land mineral resources would result in surface disturbance and potential for the spread of noxious weeds. Restrictions on surface disturbance in some areas would help reduce the potential for adverse impacts to upland vegetation. Proper reclamation in upland areas would benefit upland vegetation.
Visual Resources Actions	No impact; there are no proposed decisions that would impact upland vegetation and noxious weed management.

Resource	Impacts from Management Common to All Action Alternatives
Upland Vegetation/Noxious Weed Management Actions	Beneficial impact from prohibiting surface disturbances in areas with Lehmann lovegrass and COAs, BMPs, and other management prescriptions that specifically address the proper methods for minimizing the spread of noxious weeds. Protection of any known special status plant species with a 656-foot buffer from any noxious weed treatments.
Soil Resources Actions	No impact; no proposed decisions listed.
Karst Resources Actions	No impact; proposed management decisions would not impact upland vegetation/noxious weed management.
Special Status Species Actions	Prescriptions for protecting special status species habitat benefit vegetation by maintaining plant community abundance and diversity and minimizing soil erosion, compaction, and likelihood of noxious weed invasion
Riparian/Water Resource Actions	Prioritization of riparian areas restoration would contribute to an indirect increased shift toward DPC for upland vegetation.
Wildland Fire and Fuels Management Actions	Applied management prescriptions (prescribed fire included) to avoid removing vegetation down to soil or completely consume the vegetation would beneficially impact upland vegetation by minimizing soil erosion and sedimentation but may create more long-term adverse impacts if non-native species are allowed to spread. Avoidance of prescribed fire within either 0.5 or 1 mile of known bat roosts would increase the threat of high-severity wildfire and its impact to vegetation in these areas.
Livestock Grazing Actions	Reduced livestock grazing would minimize trampling and direct loss of vegetation, decrease the potential for soil erosion and compaction, and reduce the spread of noxious weeds and invasive plants in these areas.
Land Use Authorization Actions	Potential adverse impacts as a result of 184,201 acres designated as ROW corridors. Impacts would vary depending on particular ROW projects, their locations and plant composition of the area. Permanent pipelines greater than 4 inches in diameter or greater than 125 pounds per square inch (psi) would be buried with exceptions made for pipeline burial in particular soil types (limestone hills, shallow sites) that would be deemed impractical.
Travel/Recreation Management Actions	Impacts would vary as some proposed management actions would minimize adverse impacts, such as limiting camping and restrictions on motorized use would, and others would contribute to adverse impacts, such as increasing the number of trails.
Special Designations Actions	Black River would be recommended as suitable for inclusion in the NWSRS. The WSR designation would limit surface-disturbing activities that would potentially result in adverse impacts to these vegetation, such as alterations in plant community composition, direct removal of native plant species, increased erosion, compaction, and likelihood for noxious weed invasion.
Lands with Wilderness Characteristics Actions	Indirect beneficial impacts on upland vegetation within LWCs as a result of management prescriptions that aim to minimize surface disturbances.
Fish and Wildlife Actions	Indirect benefit through promotion of wildlife movement corridors and HMPs to ensure the enhancement of several vegetation communities and habitat types across the planning area; seasonal restrictions on all surface-disturbing activities within approximately 252 acres or a 0.25-mile radius around active heronries.
Mineral Development Actions	Applicable stipulations or mitigation measures would reduce the potential for adverse impacts to upland vegetation.
Visual Resources Actions	No impact; there are no proposed decisions that would impact karst resources.

2.37.1 Impacts Varying Across Alternatives

2.37.1.1 Livestock Grazing Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Short-term and long-term adverse impacts resulting from 2,086,107 acres open to livestock grazing.	Short-term and long-term adverse impacts resulting from 1,598,198 acres open to livestock grazing.	Short-term and long-term adverse impacts resulting from 1,937,725 acres open to livestock grazing.	Short-term and long-term adverse impacts resulting from 2,083,232 acres open to livestock grazing.	Short-term and long-term adverse impacts resulting from 2,087,759 acres open to livestock grazing.

2.37.1.2 Land Use Authorization Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. Adverse impacts to upland vegetation would occur in these corridors where surface disturbance would be permitted.	Same as No Action Alternative except 798,544 acres would be open to utility ROW grants.	Same as No Action Alternative except 757,380 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,610,692 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,749,782 acres would be open to utility ROW grants.

2.37.1.3 Travel/Recreation Management Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Beneficial impacts from OHV limited travel on 2,035,307 acres and closed on 55,966 acres. Travel management and recreation would have the potential to adversely impact upland vegetation resources wherever OHVs operate and wherever recreation activities are not managed. Approximately 69,469 acres of SRMAs would help limit adverse impacts to upland vegetation resources (no ERMAs designated). Management actions regarding campfires, firewood gathering, and equestrian activities would remain unchanged from the 1988 RMP. Thus, impacts to upland vegetation resources from these recreational activities would be a continuation of the trends under existing conditions.	Impacts would be slightly greater as compared to the No Action Alternative because of a 0.2% decrease in the number of acres closed to travel. Approximately 52,028 acres would be closed to travel, and the rest of the planning area (2,039,299 acres) would be OHV limited until a travel plan is completed. Approximately 49,991 acres of SRMAs and 2,975 of ERMAs would be designated, which would help limit adverse impacts to upland vegetation resources.	Impacts would be greater as compared to the No Action Alternative because of a 0.7% decrease in the number of acres closed to travel. Approximately 41,936 acres would be closed to travel, and the rest of the planning area (2,049,391 acres) would be OHV limited until a travel plan is completed. Approximately 49,988 acres of SRMAs and 26,564 acres of ERMAs would be designated, which would help limit adverse impacts to upland vegetation resources.	Impacts would be greater as compared to the No Action Alternative because of a 0.8% decrease in the number of acres closed to travel. Approximately 38,738 acres would be closed to travel, and the rest of the planning area (2,052,582 acres) would be OHV limited until a travel plan is completed. Approximately 49,669 acres of SRMAs and 17,302 acres of ERMAs would be designated, which would help limit adverse impacts to upland vegetation resources.	Impacts would be greater as compared to the No Action Alternative because of a 0.8% decrease in the number of acres closed to travel. Approximately 38,737 acres would be closed to travel (less than the No Action Alternative), and the rest of the planning area (2,052,584 acres) would be OHV limited until a travel plan is completed. Approximately 49,673 acres of SRMAs and 9,456 acres of ERMAs would be designated, which would help limit adverse impacts to upland vegetation resources.

2.37.1.4 Special Designation Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct and indirect beneficial impacts resulting from 11,997 ACEC acres designated as closed/NSO; adverse impacts would continue in areas open to livestock grazing.	Direct and indirect beneficial impacts resulting from 422,462 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 6,208 ACEC acres closed to existing OHV use and 449,747 ACEC acres closed to livestock grazing.	Direct and indirect beneficial impacts resulting from 494,794 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 6,647 ACEC acres closed to existing OHV use and 135,480 ACEC acres closed to livestock grazing.	Direct and indirect beneficial impacts resulting from 44,683 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 5,589 ACEC acres closed to OHV use and 5,735 ACEC acres closed to livestock grazing.	Direct and indirect beneficial impacts resulting from 28,894 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 4,254 ACEC acres closed to OHV use and 201 ACEC acres closed to livestock grazing.

2.37.1.5 Lands with Wilderness Characteristics Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Potential for direct and indirect adverse impacts, as no lands would be designated under LWCs.	Direct and indirect beneficial impacts as a result of 66,666 acres managed to protect lands with wilderness characteristics.	Direct and indirect beneficial impacts as a result of 47,611 acres managed to protect wilderness characteristics.	Direct and indirect beneficial impacts as a result of 5,119 acres managed to protect wilderness characteristics.	Direct and indirect beneficial impacts as a result of 1,221 acres managed to protect wilderness characteristics.

2.37.1.6 Fish and Wildlife Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Long-term and short-term beneficial impacts to upland vegetation within four designated WSAs that have management prescription that minimize surface disturbances.	Long-term and short-term beneficial impacts to upland vegetation within four designated WSAs that have management prescription that minimize surface disturbances.	Long-term and short-term beneficial impacts to upland vegetation within four designated WSAs that have management prescription that minimize surface disturbances.	Long-term and short-term beneficial impacts to upland vegetation within four designated WSAs that have management prescription that minimize surface disturbances.	Long-term and short-term beneficial impacts to upland vegetation within four designated WSAs that have management prescription that minimize surface disturbances.

2.37.1.7 Mineral Development Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct and indirect adverse impacts of varying degree across 8,636 acres with predicted surface disturbance after reclamation and 5,874 predicted wells.	Direct and indirect adverse impacts of varying degree across 6,565 acres with predicted surface disturbance after reclamation and 4,465 predicted wells.	Direct and indirect adverse impacts of varying degree across 5,202 acres with predicted surface disturbance after reclamation and 3,538 predicted wells.	Direct and indirect adverse impacts of varying degree across 8,575 acres with predicted surface disturbance and 5,832 predicted wells.	Direct and indirect adverse impacts of varying degree across 8,887 acres with predicted surface disturbance and 6,044 predicted wells.

2.37.1.8 Visual Resources Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct and indirect beneficial impacts as a result of 50,671 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct and indirect beneficial impacts as a result of 273,710 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct and indirect beneficial impacts as a result of 357,803 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct and indirect beneficial impacts as a result of 67,963 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.	Direct and indirect beneficial impacts as a result of 48,263 acres designated as VRM Class I or II, both of which prohibit or minimize ground-disturbing activities.

2.38 SUMMARY OF IMPACTS TO RIPARIAN AND WETLAND VEGETATION

Resource	Impacts from Management Common to All
Riparian and Wetland Actions	All riparian acres (7,278) would be managed to ensure water and vegetation quality for all springs, streams or other water resources identified on BLM lands, thus providing both long-term and short-term beneficial impacts.
Upland Vegetation/Noxious Weed Management Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Soil and Water Resources Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Special Status Species Management Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Wildland Fires and Fuel Management Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Livestock Grazing Actions	Long-term beneficial impacts as a result of management prescriptions including the closure of the Black River Management Area to grazing, use levels not exceeding 45%, rest periods from grazing, changes in seasonal use, and changes in stocking rates.
Recreation/Travel Management Actions	Long-term beneficial impacts as a result of preparing RAMPS for all designated SRMAs, including those within riparian areas. Closure of Black River SRMA (1,275 acres) to OHV and equestrian use and grazing would reduce the potential for impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Allowance of motorized wheeled cross-country travel for military, fire, search and rescue, or law enforcement vehicle used for emergency purposes would increase the potential for impacts to riparian vegetation, such as crushing and the spread of noxious weeds and invasive plants.
Land Use Authorization Actions	Potential adverse impacts as a result of 184,201 acres designated as ROW corridors; impacts would vary depending on particular ROW projects, their locations, and plant composition of the area.
Leasable, Salable and Locatable Minerals Actions	Surface disturbance related to mineral extraction could reduce water quality and riparian condition (PFC), causing both short- and long-term impacts to riparian and wetland vegetation, including water depletions and increased sedimentation and turbidity.
Special Designations Actions	Long-term beneficial impacts to those riparian and wetland vegetation resources within for designated WSAs (7,086 acres).
Lands with Wilderness Characteristics Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Wildlife and Fish Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Visual Resources Management Actions	There are no proposed actions that would impact riparian and wetland vegetation.

Resources	Impacts from Management Common to All Action Alternatives
Riparian and Wetland Actions	There are no proposed actions that would impact riparian and wetland vegetation
Upland Vegetation/Noxious Weed Management Actions	There are no proposed actions that would impact riparian and wetland vegetation
Soil and Water Resources Actions	There are no soils and water management actions common to all action alternatives.
Special Status Species Management Actions	There are no proposed actions that would impact riparian and wetland vegetation
Wildland Fires and Fuel Management Actions	There are no proposed actions that would impact riparian and wetland vegetation
Livestock Grazing Actions	Long-term beneficial impacts as a result of stocking rates and seasonal use on the Pecos River, closure of all riparian springs and riparian zones to grazing.
Recreation/Travel Management Actions	Long-term beneficial impacts as a result of prohibiting camping within 900 feet of areas with natural water sources (excluding the Pecos River) and constructing roads in accordance with BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development (BLM 2007).*
Land Use Authorization Actions	There are no proposed actions that would impact riparian and wetland vegetation
Leasable, Salable and Locatable Minerals Actions	There are no proposed actions that would impact riparian and wetland vegetation
Special Designations Actions	Beneficial impacts to riparian vegetation within the Black River riparian system because it would be recommended as suitable for inclusion in the NWSRS; surface disturbances would be limited.
Lands with Wilderness Characteristics Actions	Riparian and wetland vegetation designated as LWCs would receive beneficial impacts because surface disturbances would be minimized within these designations.
Fish and Wildlife Actions	There are no proposed actions that would impact riparian and wetland vegetation.
Visual Resources Management Actions	There are no proposed actions that would impact riparian and wetland vegetation.

2.38.1 Livestock Grazing Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Current livestock grazing management prescriptions would remain in place and include keeping 5,000 acres of unallotted tracts open to livestock grazing. Livestock grazing would not be permitted from November through March on the Delaware River, and a small portion along the Black River would be open to livestock grazing	Delaware River could be closed to grazing seasonally (November to March), and grazing would be removed from within 656 feet on either side of the Black River.	Sections within 0.25 mile of riparian areas would be closed to livestock grazing, including areas around the Pecos, Black, and Delaware Rivers. Other areas closed to livestock grazing that are important riparian habitat include the Cottonwood Day Use Area.	Livestock grazing would be removed from all riparian pastures along both sides of the Delaware River.	Same as the No Action Alternative

2.38.2 Recreation/Travel Management Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Beneficial impacts from OHV limited travel on 2,035,307 acres and closed on 55,966 acres. Travel management and recreation would have the potential to adversely impact riparian and wetland vegetation resources wherever OHVs operate and wherever recreation activities are not managed. Approximately 69,469 acres of SRMAs would help limit adverse impacts to upland vegetation resources (no ERMAs designated). Management actions regarding campfires, firewood gathering, and equestrian activities would remain unchanged from the 1988 RMP. Thus, impacts to riparian and wetland vegetation resources from these recreational activities would be a continuation of the trends under existing conditions.	Impacts would be slightly greater as compared to the No Action Alternative because of a 0.2% decrease in the number of acres closed to travel. Approximately 52,028 acres would be closed to travel, and the rest of the planning area (2,039,299 acres) would be OHV limited until a travel plan is completed. Approximately 49,991 acres of SRMAs and 2,975 of ERMAs would be designated, which would help limit adverse impacts to riparian and wetland vegetation resources.	Impacts would be greater as compared to the No Action Alternative because of a 0.7% decrease in the number of acres closed to travel. Approximately 41,936 acres would be closed to travel, and the rest of the planning area (2,049,391 acres) would be OHV limited until a travel plan is completed. Approximately 49,988 acres of SRMAs and 26,564 acres of ERMAs would be designated, which would help limit adverse impacts to riparian and wetland vegetation resources.	Impacts would be greater as compared to the No Action Alternative because of a 0.8% decrease in the number of acres closed to travel. Approximately 38,738 acres would be closed to travel, and the rest of the planning area (2,052,582 acres) would be OHV limited until a travel plan is completed. Approximately 49,669 acres of SRMAs and 17,302 acres of ERMAs would be designated, which would help limit adverse impacts to riparian and wetland vegetation resources.	Impacts would be greater as compared to the No Action Alternative because of a 0.8% decrease in the number of acres closed to travel. Approximately 38,737 acres would be closed to travel (less than the No Action), and the rest of the planning area (2,052,584 acres) would be OHV limited until a travel plan is completed. Approximately 49,673 acres of SRMAs and 9,456 acres of ERMAs would be designated, which would help limit adverse impacts to riparian and wetland vegetation resources.

2.38.3 Land Use Authorization Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. Adverse impacts to riparian and wetland vegetation would occur in these corridors where surface disturbance would be permitted.	Same as No Action Alternative except 798,544 acres would be open to utility ROW grants.	Same as No Action Alternative except 757,380 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,610,692 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,749,782 acres would be open to utility ROW grants.

2.38.4 Mineral Development Actions

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Direct and indirect adverse impacts of varying degree across 8,636 acres with predicted surface disturbance after reclamation and 5,874 predicted wells.	Direct and indirect adverse impacts of varying degree across 6,565 acres with predicted surface disturbance after reclamation and 4,465 predicted wells.	Direct and indirect adverse impacts of varying degree across 5,202 acres with predicted surface disturbance after reclamation and 3,538 predicted wells.	Direct and indirect adverse impacts of varying degree across 8,575 acres with predicted surface disturbance and 5,832 predicted wells.	Direct and indirect adverse impacts of varying degree across 8,887 acres with predicted surface disturbance and 6,044 predicted wells.

2.38.5 Special Designations

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
13,516 acres would be designated as ACECs; WSAs would remain under current designation and managed to minimize surface-disturbing activities; Black and Delaware Rivers not given WSR designation.	495,042 acres would be designated as ACECs; WSAs managed with ROW exclusion; 1,030 acres of the Black River and 2,222 acres of the Delaware River recommended for inclusion in the WSR system.	561,441 acres would be designated as ACECs; WSAs managed with ROW exclusion; 1,030 acres of the Black River recommended for inclusion in the WSR system.	98,644 acres would be designated as ACECs; WSAs managed with ROW exclusion; 1,030 acres of the Black River recommended for inclusion in the WSR system.	28,894 acres would be designated as ACECs; WSA management less stringent than under other action alternatives; 1,030 acres of the Black River recommended for inclusion in the WSR system.

2.38.6 Wildlife and Fish

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
No impacts.	No impacts.	No impacts.	No impacts.	No impacts.

2.38.7 Visual Resources Management

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Long-term beneficial impacts as a result of 50,671 acres designated as VRM Class I or II.	Long-term beneficial impacts as a result of 273,710 acres designated as VRM Class I or II.	Long-term beneficial impacts as a result of 357,803 acres designated as VRM Class I or II.	Long-term beneficial impacts as a result of 67,963 acres designated as VRM Class I or II.	Long-term beneficial impacts as a result of 48,263 acres designated as VRM Class I or II.

2.39 SUMMARY OF IMPACTS TO FISH RESOURCES

Resource	Impacts from Management Common to All
Wildlife and Fish Resources	No management decisions common to all alternatives for wildlife and fish management would impact fish.
Riparian Resources	No management decisions common to all alternatives for riparian resource management would impact fish.
Water Resources	No management decisions common to all alternatives for water resource management would impact fish.
Vegetation, including Noxious Weeds	No management decisions common to all alternatives for vegetation management would impact fish.
Special Status Species	No management decisions common to all alternatives for special status species management would impact fish.
Wildland Fire and Fuels Management	No management decisions common to all alternatives for wildland fire management would impact fish.
Livestock Grazing	Under all alternatives, the Black River Management area would be closed to grazing, which would beneficially impact fish resources.
Recreation	The Pecos River Corridor (5,619 acres) SRMA would be closed to all surface-disturbing activities, which would minimize adverse impacts to fish.
Travel Management	No management decisions common to all alternatives for travel management would impact fish.
Land Use Authorizations	No management decisions common to all alternatives for land use authorizations management would impact fish.
Mineral Resources	No management decisions common to all alternatives for mineral resource management would impact fish.
Special Designations	7,086 acres would remain under WSA designation. Management prescriptions under WSA designation include closure to mineral development leasing. This would minimize potential adverse impacts to fish resources associated with ground disturbances, such as increased sedimentation and erosion, increased turbidity, alterations in habitat and water quality, and water depletions.
Visual Resources	No management decisions common to all alternatives for visual resources would impact fish.

Impacts from Management Common to All Action Alternatives	
Wildlife and Fish Resources	No management decisions common to all action alternatives for wildlife and fish would impact fish.
Riparian Resources	No management decisions common to all action alternatives for riparian resource would impact fish.
Water Resources	No management decisions common to all action alternatives for water resources would impact fish.
Vegetation, including Noxious Weeds	No management decisions common to all action alternatives for vegetation would impact fish.
Special Status Species	No management decisions common to all action alternatives for special status species would impact fish.
Wildland Fire and Fuels Management	No management decisions common to all action alternatives for wildland fire and fuels management would impact fish.
Livestock Grazing	No management decisions common to all action alternatives for livestock grazing would impact fish.
Recreation	All action alternatives in the planning area would maintain water quality in natural water sources by prohibiting camping within 900 feet of these areas (excluding the Pecos River). This would benefit native fish by reducing disturbance near riparian areas, maintaining or improving water quality, reducing sedimentation, and contributing to the overall health of riparian ecosystems near recreational areas.
Travel Management	Roads would be constructed and maintained as per the BLM's Surface Operating Standards and Guidelines for Oil and Gas Development (BLM 2007b). Additionally, all surfacing material on oil and gas roads must be removed at the time of abandonment. Both of these management actions would impart indirect beneficial impacts to fish resources by minimizing the potential for erosion, runoff and contamination of streams, rivers and other water bodies that provide habitat for fish.
Land Use Authorizations	No management decisions common to all action alternatives for land use authorizations would impact fish.
Mineral Resources	No management decisions common to all action alternatives for mineral resources would impact fish.
Special Designations	3.7 miles the Black River would be recommended as suitable for inclusion in the National Wild and Scenic River System. Management prescriptions associated with the designated WSR segment would beneficially impact fish resources because potential adverse impacts, such as increased sedimentation and turbidity, decreased stream vegetation, and water quality alterations, would be minimized.
Visual Resources	No management decisions common to all action alternatives for visual resources would impact fish.

Impacts from Management Common to All Action Alternatives				
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
2,086,107 acres would be open to livestock grazing. 5,226 acres would be closed to grazing. Alternatives that reduce the total number of acres open for grazing would be the most beneficial to aquatic resources. Negative impacts from grazing, however, can be mitigated through the use of grazing season deferment and by following grazing management plans and other planning documents such as BLM standards and guidelines (BLM 2001).	The same impacts as the No Action Alternative except 1,598,198 acres would be open to livestock grazing.	The same impacts as the No Action Alternative except 1,937,725 acres would be open to livestock grazing.	The same impacts as the No Action Alternative except 2,083,232 acres would be open to livestock grazing.	The same impacts as the No Action Alternative except 2,087,759 acres would be open to livestock grazing.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts from OHV limited travel on 2,035,307 acres and closed on 55,966 acres. Travel management and recreation would have the potential to adversely impact aquatic resources wherever OHVs operate and wherever recreation activities are not managed. Approximately 68,194 acres of SRMAs would help limit adverse impacts to aquatic resources (no ERMAs designated). Management actions regarding campfires, firewood gathering, and equestrian activities would remain unchanged from the 1988 RMP. Thus, impacts to aquatic resources from these recreational activities would be a continuation of the trends under existing conditions.	Impacts would be more beneficial as compared to the No Action Alternative. Approximately 52,028 acres would be closed to travel, and the rest of the planning area (2,039,299 acres) would be OHV limited until a travel plan is completed. Approximately 49,991 acres of SRMAs and 2,975 of ERMAs would be designated, which would help limit adverse impacts to aquatic resources.	Impacts would be more beneficial as compared to the No Action Alternative. Approximately 41,936 acres would be closed to travel, and the rest of the planning area (2,049,391 acres) would be OHV limited until a travel plan is completed. Approximately 49,988 acres of SRMAs and 26,564 acres of ERMAs would be designated, which would help limit adverse impacts to aquatic resources.	Impacts would be more beneficial as compared to the No Action Alternative. Approximately 38,738 acres would be closed to travel, and the rest of the planning area (2,052,582 acres) would be OHV limited until a travel plan is completed. Approximately 49,669 acres of SRMAs and 17,302 acres of ERMAs would be designated, which would help limit adverse impacts to aquatic resources.	Impacts would be less beneficial as compared to the No Action Alternative. Approximately 38,737 acres would be closed to travel (less than the No Action), and the rest of the planning area (2,052,584 acres) would be OHV limited until a travel plan is completed. Approximately 49,673 acres of SRMAs and 9,456 acres of ERMAs would be designated, which would help limit adverse impacts to aquatic resources.

Impacts from Management Common to All Action Alternatives				
Land Use Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. Adverse impacts to aquatic would occur in these corridors where surface disturbance would be permitted.	Same as No Action Alternative except 798,544 acres would be open to utility ROW grants.	Same as No Action Alternative except 757,380 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,610,692 acres would be open to utility ROW grants.	Same as No Action Alternative except 1,749,782 acres would be open to utility ROW grants.
Mineral Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Direct and indirect adverse impacts of varying degree across 8,636 acres with predicted surface disturbance after reclamation and 5,874 predicted wells.	Direct and indirect adverse impacts of varying degree across 6,565 acres with predicted surface disturbance after reclamation and 4,465 predicted wells.	Direct and indirect adverse impacts of varying degree across 5,202 acres with predicted surface disturbance after reclamation and 3,538 predicted wells.	Direct and indirect adverse impacts of varying degree across 8,575 acres with predicted surface disturbance and 5,832 predicted wells.	Direct and indirect adverse impacts of varying degree across 8,887 acres with predicted surface disturbance and 6,044 predicted wells.
Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Direct and indirect beneficial impacts resulting from 11,997 ACEC acres designated as closed/NSO; adverse impacts would continue in areas open to livestock grazing.	Direct and indirect beneficial impacts resulting from 422,462 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 6,208 ACEC acres closed to existing OHV use and 449,747 ACEC acres closed to livestock grazing.	Direct and indirect beneficial impacts resulting from 494,794 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 6,647 ACEC acres closed to existing OHV use and 135,480 ACEC acres closed to livestock grazing.	Direct and indirect beneficial impacts resulting from 44,683 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 5,589 ACEC acres closed to OHV use and 5,735 ACEC acres closed to livestock grazing.	Direct and indirect beneficial impacts resulting from 28,894 ACEC acres designated as closed/NSO; adverse impacts would be minimized within 4,254 ACEC acres closed to OHV use and 201 ACEC acres closed to livestock grazing.

Impacts from Management Common to All Action Alternatives				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long-term beneficial impacts as a result of 50,671 acres designated as VRM Class I or II. Fish resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	Long-term beneficial impacts as a result of 273,710 acres designated as VRM Class I or II. Fish resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	Long-term beneficial impacts as a result of 357,803 acres designated as VRM Class I or II. Fish resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	Long-term beneficial impacts as a result of 67,963 acres designated as VRM Class I or II. Fish resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	Long-term beneficial impacts as a result of 48,263 acres designated as VRM Class I or II. Fish resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.

2.40 SUMMARY OF IMPACTS TO WILDLIFE

Summary of Impacts to Wildlife				
Impacts from Management Common to All				
Special Status Species	Beneficial impacts to wildlife from avian survey and buffer requirements, reclamation practices, and restrictions on surface-disturbing activities in known special status habitats.			
Fish and Wildlife				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse impacts on wildlife from no specific management actions regarding management of the Birds of Prey Grasslands area.	Benefits for wildlife from designation of Birds of Prey Grassland ACEC (349,399 acres).	Same as Alternative A.	Same as No Action Alternative.	Same as No Action Alternative.
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Minor beneficial impacts due to the small area (50,671 acres) subject to VRM Class I and II restrictions.	Beneficial impacts from 273,710 acres subject to VRM Class I and II restrictions.	Most beneficial impacts due to the greatest area (357,802 acres) subject to VRM Class I and II restrictions.	Beneficial impacts from 67,962 acres subject to VRM Class I and II restrictions.	Beneficial impacts from 48,263 acres subject to VRM Class I and II restrictions.

Summary of Impacts to Wildlife				
Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse impacts could occur in the 57% of the planning area open to leasable minerals development.	Adverse impacts could occur in the 41% of the planning area open to leasable minerals development.	Adverse impacts could occur in the 39% of the planning area open to leasable minerals development.	Adverse impacts could occur in the 63% of the planning area open to leasable minerals development.	Adverse impacts could occur in the 72% of the planning area open to leasable minerals development.
Land Use Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse removal of habitat, surface disturbance, and habitat degradation due to construction within ROWs and utility corridors, 7,056 acres of exclusion designation, and 30,965 acres of avoidance designation.	More beneficial impacts than No Action Alternative because of 662,038 acres of exclusion designation and 629,149 acres of avoidance designation.	More beneficial impacts than all other alternatives because of 918,701 acres of exclusion designation and 413,654 acres of avoidance designation.	More beneficial impacts than the No Action Alternative because of165,378 acres of exclusion designation and 313,619 acres of avoidance designation.	More beneficial impacts than the No Action Alternative because of 69,540 acres of exclusion designation and 270,360 acres of avoidance designation.
Renewable Energy				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Potential for mortality, habitat loss, and fragmentation due to renewable energy development.	Beneficial impacts from renewable energy development exclusions from lands with wilderness characteristics, lesser prairie-chicken HAs, wetland and riparian areas, the Guadalupe Mountain face, aplomado falcon grasslands, critical habitat, and T&E habitat.	Same as Alternative A, except renewable development would be avoided (not excluded) in T&E habitat.	Same as Alternative B, except renewable development would also be avoided in aplomado falcon grasslands.	Same as Alternative B, except renewable development would be open in aplomado falcon grasslands.

Summary of Impacts to Wildlife				
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Grazing exclusion would have long-term beneficial effects on wildlife habitats in excluded areas, including riparian habitats. This alternative would have 5,226 acres excluded from grazing, leading to the fewest beneficial impacts.	This alternative would have the most beneficial impacts because of 493,120 acres excluded from grazing.	This alternative would have 153,583 acres excluded from grazing leading to beneficial impacts for wildlife.	This alternative would have 8,115 acres excluded from grazing leading to beneficial impacts for wildlife.	This alternative would have 3,594 acres excluded from grazing leading to beneficial impacts for wildlife.
Travel and Recreation Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Minor adverse impact from surface disturbance and human-caused disturbance from 2,035,307 of area designated as OHV limited; beneficial impacts from 55,966 OHV closed.	Same as No Action Alternative with 2,039,299 acres as OHV limited and 52,028 acres as OHV closed.	Same as No Action Alternative with 2,049,391 acres as OHV limited and 41,936 acres as OHV closed.	Same as No Action Alternative with 2,052,582 acres would be OHV limited and 38,738 acres would be OHV closed.	Same as Alternative C.
Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No new ACECs would be designated. Beneficial protection would occur on the existing 13,516 acres of ACECs.	Beneficial impacts from management of a total of 495,042 acres as ACECs.	Beneficial impacts from management of a total of 561,441 acres as ACECs.	Beneficial impacts from management of a total of 98,644 acres as ACECs.	Beneficial impacts from management of a total of 28,894 acres as ACECs.

2.41 SUMMARY OF IMPACTS TO SPECIAL STATUS PLANTS

Summary of Impacts to Special Status Plants				
Impacts from Management Common to All				
Vegetative Communities	Noxious weed management would reduce the spread of single seed juniper, benefiting Kuenzler's hedgehog cactus by making historic habitat available for recolonization.			
Wildland Fire and Fuel	Wildland fire would be used to help restore the ecosystem to a state whereby special status plants could recolonize historical and new locations, leading to beneficial impacts. However, during treatment individuals and populations could be burned beyond recovery, leading to reduction in overall population abundance. Exact impacts would depend on the location and nature of each individual fire.			
Livestock Grazing	In general, livestock grazing could degrade habitat quality, ultimately leading to reduction in population density. Cattle could also disperse honey mesquite, a tree that outcompetes other vegetation and reduces habitat availability for plants.			
Renewable Energy	100% of Lee's pincushion cactus habitat would be withdrawn from all renewable energy development.			
Impacts from Management Common to All Action Alternatives				
Lands with Wilderness Characteristics	LWC management is generally beneficial for special status plants due to restrictions on surface disturbing activities. No acres of gypsum wild buckwheat would be managed as LWC, with no beneficial impacts on that species.			
Minerals	All Lee's pincushion habitat would be closed to or withdrawn from leasable and salable minerals development, avoiding all impacts on that species.			
Impacts Varying Across Alternatives				
Special Status Species				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Identical to Impacts Common to All Alternatives.	Beneficial impacts due to prioritization vegetation treatments that would create special status plant habitat, a blanket prohibition on cactus collection above 5,200 feet in elevation, and required surveys in known or potential habitat prior to project implementation.	Vegetation treatments would avoid, but not create special status plant habitat; cactus collection would be prohibited in all potential Kuenzler's hedgehog cactus habitat and within 1-mile of known special status plant habitats; and surveys would be required for projects within 0.25-mile of known habitat. These actions would result in fewer beneficial impacts than Alternative A.	Same as Alternative B.	Kuenzler's hedgehog cactus could not be collected under any circumstances, and special status plant populations would be avoided but no survey would be required. These actions would result in fewer beneficial impacts than Alternative A.

Summary of Impacts to Special Status Plants				
Lands with Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No new LWC would be designated, resulting in no beneficial impacts on special status plants.	A total of 66,666 acres would be managed as LWC, benefitting special status plants present in those areas. 24% of potential Kuenzler's hedgehog cactus habitat and 91% of known Lee's pincushion habitat would be designated as LWC, benefitting these species.	A total of 47,611 acres would be managed as LWC, benefitting special status plants present in those areas. 33% of potential Kuenzler's hedgehog cactus habitat and 91% of known Lee's pincushion habitat would be designated as LWC, benefitting these species.	A total of 35,715 acres would be managed as LWC, benefitting special status plants present in those areas. 2% of potential Kuenzler's hedgehog cactus habitat and 91% of known Lee's pincushion habitat would be designated as LWC, benefitting these species.	A total of 4,348 acres would be managed as LWC, benefitting special status plants present in those areas. 91% of known Lee's pincushion habitat would be designated as LWC, benefitting these species. Less than 1% of potential Kuenzler's hedgehog cactus habitat would be designated, resulting in minimal impact on the species.
Air Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Stipulations regarding fugitive dust would be incorporated into project proposals to meet air quality standards, resulting in potential adverse impacts on special status plants adjacent to surface-disturbing activities.	Measures would be required to reduce fugitive dust from traffic, equipment operations, or wind events by 50%, resulting in greater beneficial impacts than the No Action Alternative.	Same as Alternative A.	No similar management action, resulting in no beneficial impacts.	Same as Alternative C.

Summary of Impacts to Special Status Plants				
Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Leasable: Potential for adverse impacts on 0% of gypsum wild buckwheat habitat and 78% of potential Kuenzler's hedgehog cactus habitat because of open designation. **Salable:** No potential for adverse impacts on gypsum wild buckwheat habitat, and 94% of potential Kuenzler's hedgehog cactus habitat because of open designation. **Locatable:** Potential for adverse impacts on 80% of gypsum wild buckwheat habitat, 97% of potential Kuenzler's hedgehog cactus habitat, and 9% of Lee's pincushion cactus habitat because of open designation.	**Leasable:** Same as the No Action Alternative for gypsum wild buckwheat. Potential for adverse impacts on 60% of Kuenzler's hedgehog cactus habitat because of open designation. **Salable:** Potential for adverse impacts on 23% of gypsum wild buckwheat habitat, and 63% of Kuenzler's hedgehog cactus habitat because of open designation. **Locatable:** Potential for adverse impacts on 23% of gypsum wild buckwheat habitat, and 73% of potential Kuenzler's hedgehog cactus habitat because of open designation.100% of Lee's pincushion cactus habitat would be closed.	**Leasable:** Same as the No Action Alternative for gypsum wild buckwheat. Same as Alternative A for Kuenzler's hedgehog cactus habitat because of open designation. **Salable:** Potential for adverse impacts on 8% of gypsum wild buckwheat habitat, and 42% of Kuenzler's hedgehog cactus habitat because of open designation. **Locatable:** Potential for adverse impacts on 7% of gypsum wild buckwheat habitat and Kuenzler's hedgehog cactus habitat is same as Alternative A because of open designation. 100% of Lee's pincushion cactus habitat would be closed.	**Leasable:** Same as the No Action Alternative for gypsum wild buckwheat. Potential for adverse impacts on 73% for Kuenzler's hedgehog cactus habitat because of open designation. **Salable:** No potential for adverse impacts on gypsum wild buckwheat habitat, and 74% of potential Kuenzler's hedgehog cactus habitat because of open designation. **Locatable:** Potential for adverse impacts on 77% of gypsum wild buckwheat habitat, and 96% of Kuenzler's hedgehog cactus habitat because of open designation. 100% of Lee's pincushion cactus habitat would be closed.	**Leasable:** Same as the No Action Alternative for gypsum wild buckwheat. Potential for adverse impacts on 95% Kuenzler's hedgehog cactus habitat because of open designation. **Salable:** No potential for adverse impacts on gypsum wild buckwheat habitat, and 92% of potential Kuenzler's hedgehog cactus habitat because of open designation. **Locatable:** Potential for adverse impacts for gypsum wild buckwheat and Kuenzler's hedgehog cactus habitat is same as Alternative C. 100% of Lee's pincushion cactus habitat would be closed.

Summary of Impacts to Special Status Plants				
Land Use Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
There is a portion of lands acquired for special status species would be excluded from ROW development, benefitting special status plants by avoiding surface disturbing activities and fragmentation. ROW development would be avoided in SMAs, ACECs, and WSAs benefitting the special status plants in those areas.	Pipeline, road, communication site, and power line development would be excluded from designated and proposed critical habitat and habitat for threatened and endangered species, benefitting these species. ROW development would be avoided in habitat of candidate and BLM sensitive species, benefitting these species by reducing the likelihood of ROW development.	Same as Alternative A except ROW development would be excluded from habitat for candidate species, further benefitting those species.	ROW development would be avoided, not excluded, from designated and proposed critical habitat, habitat for threatened, endangered, and candidate species, and BLM sensitive species habitat. This would benefit these species by reducing the likelihood of ROW development, but would not benefit them as much as excluding development from these areas.	Same as Alternative C.
Renewable Energy				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
98% of the gypsum wild buckwheat and 6% of potential Kuenzler's hedgehog cactus habitats closed or excluded from geothermal and solar development; 98% of gypsum wild buckwheat and 51% of potential Kuenzler's hedgehog cactus habitats avoidance for wind.	78% of the gypsum wild buckwheat and 35% of potential Kuenzler's hedgehog cactus habitats closed for geothermal and solar development; 78% of gypsum wild buckwheat and 33% of potential Kuenzler's hedgehog cactus excluded to wind development.	93% of the gypsum wild buckwheat habitat closed or excluded to geothermal, solar, and wind development. 35% of the Kuenzler's hedgehog cactus habitat closed or excluded to geothermal and solar development, and 33% excluded to wind development.	93% of the gypsum wild buckwheat habitat closed or excluded from geothermal, and solar development, and 69% avoided from wind development. 33% of the Kuenzler's hedgehog cactus habitat closed or excluded from geothermal and solar development, and 11% avoided from wind development.	22% of the gypsum wild buckwheat closed or excluded from geothermal, solar, and wind development; 15% Kuenzler's hedgehog cactus habitats closed or excluded from geothermal and solar development, and 28% avoided for wind development.

Summary of Impacts to Special Status Plants				
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Livestock grazing would be closed in 5,226 acres, benefitting the special status plants within that area. However, 2,086,107 acres would be open to livestock grazing.	Grazing would be closed in 493,120 acres, including in areas with habitat for Tharp's bluestar and gypsum wild buckwheat (177 acres), benefitting those species and others that occur within that area.	Grazing would be closed in 153,583 acres, including potential habitat for Kuenzler's hedgehog cactus and gypsum wild buckwheat (177 acres), benefitting those species and others that occur within that area.	Grazing would be closed in 8,115 acres that don't overlap with known special status species habitats, but could benefit unknown species that occur within that area.	Grazing would be closed in 3,594 acres that don't overlap with known special status species habitats, but could benefit unknown species that occur within that area.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
55,966 acres would be closed to OHV use, which could benefit special status plant habitat.	52,028 acres would be closed to OHV use, which could cause more potential for adverse impacts than the No Action Alternative.	41,936 acres would be closed to OHV use, which could cause more potential for adverse impacts than the No Action Alternative.	38,738 acres would be closed to OHV use, which could cause more potential for adverse impacts than the No Action Alternative.	38,737 acres would be closed to OHV use, which would cause more potential for adverse impacts than the No Action Alternative.
Special Designations Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
A total of 13,435 acres would be managed as ACECs. Special status plants occurring within this area could benefit from this action.	A total of 495,042 acres would be managed as ACECs. Special status plant species and others occurring within this area would benefit.	A total of 561,433 acres would be managed as ACECs. Special status plant species and others occurring within this area would benefit.	A total of 98,562 acres would be managed as ACECs. Special status plant species and others occurring within this area would benefit.	A total of 28,894 acres would be managed as ACECs. Special status plant species and others occurring within this area would benefit.

2.42 SUMMARY OF IMPACTS TO SPECIAL STATUS FISH

Summary of Impacts to Special Status Fish	
Impacts from Management Common to All	
Special Status Species	No management decisions common to all alternatives for special status species would impact special status fish.
Fish and Wildlife Resources	No management decisions common to all alternatives for wildlife and fish would impact special status fish.
Riparian Resources	No management decisions common to all alternatives for riparian resources would impact special status fish.
Water Resources	No management decisions common to all alternatives for water resources would impact special status fish.
Vegetation, including Noxious Weeds	No management decisions common to all alternatives for vegetation would impact special status fish.
Wildland Fire and Fuels Management	No management decisions common to all alternatives for wildland fire management would impact special status fish.
Livestock Grazing	The Black River Management Area would be closed to grazing.
Recreation	The Pecos River Corridor (8,348 acres) SRMA would be closed to all surface-disturbing activities, which would minimize adverse impacts to special status fish.
Travel Management	No management decisions common to all alternatives for travel management would impact special status fish.
Land Use Authorizations	No management decisions common to all alternatives for land use authorizations would impact special status fish.
Mineral Resources	No management decisions common to all alternatives for mineral resources would impact special status fish.
Special Designations	In all, 7,086 acres would remain under WSA designation. Management prescriptions under WSA designation include closure to mineral development leasing. This would minimize potential adverse impacts to special status fish habitat associated with ground disturbances such as increased sedimentation and erosion, increased turbidity, alterations in habitat and water quality, and water depletions.
Visual Resources	No management decisions common to all alternatives for visual resources would impact special status fish.
Impacts from Management Common to All Action Alternatives	
Special Status Species	No management decisions common to all action alternatives for special status species would impact fish.
Fish and Wildlife Resources	No management decisions common to all action alternatives for wildlife and fish would impact special status fish.
Riparian Resources	No management decisions common to all action alternatives for riparian resource would impact special status fish.
Water Resources	No management decisions common to all action alternatives for water resources would impact special status fish.
Vegetation, including Noxious Weeds	No management decisions common to all action alternatives for vegetation would impact special status fish.

Summary of Impacts to Special Status Fish	
Wildland Fire and Fuels Management	No management decisions common to all action alternatives for wildland fire and fuels management would impact special status fish.
Livestock Grazing	No management decisions common to all action alternatives for livestock grazing would impact special status fish.
Recreation	All action alternatives in the planning area would maintain water quality in natural water sources by prohibiting camping within 900 feet of these areas (excluding the Pecos River). This would benefit special status fish by reducing disturbance near riparian areas, maintaining or improving water quality, reducing sedimentation, and contributing to the overall health of riparian ecosystems near recreational areas.
Travel Management	Roads would be constructed and maintained as per the BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development* (BLM 2007b). Additionally, all surfacing material on oil and gas roads would be removed at the time of abandonment. Both these management actions would impart indirect beneficial impacts to special status fish by minimizing the potential for erosion, runoff, and contamination of streams, rivers, and other water bodies that provide habitat for fish.
Land Use Authorizations	No management decisions common to all action alternatives for land use authorizations would impact special status fish.
Mineral Resources	No management decisions common to all action alternatives for mineral resources would impact special status fish.
Special Designations	In all, 3.7 miles the Black River would be recommended as suitable for inclusion in the National Wild and Scenic River System. The designated WSR segments would beneficially impact special status fish such as the bigscale logperch, blue sucker, and gray redhorse because the designation would prioritize resource management for the protection of the river.
Visual Resources	No management decisions common to all action alternatives for visual resources would impact special status fish.

Impacts Varying Across Alternatives				
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Current livestock grazing management prescriptions would remain in place and include keeping 5,000 acres of unallotted tracts open to livestock grazing. This alternative would also close 5,226 acres to livestock grazing.	In all, 493,120 acres would be closed to livestock grazing. This includes 5,000 acres of unallotted tracts that would be closed to grazing to protect wildlife vegetation and watershed health. Those retired AUMs in close proximity to riparian areas, rivers, and streams would provide beneficial impacts to special status fish because negative effects on habitat and water quality would be minimized.	In all, 153,583 acres would be closed to livestock grazing, which includes 5,000 acres of unallotted tracts. These livestock management decisions would have an indirect beneficial impact to special status fish species by reducing the amount of erosion, sedimentation, and loss of vegetation cover that can adversely impact fish habitat.	In all, 8,115 acres would be closed to livestock. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Impacts to special status fish would be the same as under Alternative B.	In all, 3,594 acres would be closed to livestock grazing. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Impacts to special status fish would be the same as under Alternative B.

Summary of Impacts to Special Status Fish				
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
55,966 acres would be closed to OHV use, which could benefit special status fish species.	52,028 acres would be closed to OHV use, which could cause more potential for adverse impacts to special status fish species than the No Action Alternative.	41,936 acres would be closed to OHV use, which could cause more potential for adverse impacts to special status fish species than the No Action Alternative.	38,738, acres would be closed to OHV use, which could cause more potential for adverse impacts to special status fish species than the No Action Alternative.	38,737 acres would be closed to OHV use, which could cause more potential for adverse impacts to special status fish species than the No Action Alternative.
Land Use Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse impacts minimized on 30,965 acres designated as avoidance and 7,056 excluded from ROW development. These designations would benefit special status fish by minimizing ROW construction and associated fragmentation and disturbance near or within these important habitat areas.	Adverse impacts minimized on 629,149 acres designated as avoidance and 662,038 excluded from ROW development.	Adverse impacts minimized on 413,654 acres designated as avoidance and 918,701 excluded from ROW development.	Adverse impacts minimized on 313,619 acres designated as avoidance and 165,378 excluded from ROW development.	Adverse impacts minimized on 270,360 acres designated as avoidance and 69,540 excluded from ROW development.
Mineral Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
The greater the numbers of acres open to mineral development, the greater the potential for impacts to special status fish, as watershed health and overall riparian condition would become more vulnerable to degradation. Under the No Action Alternative, 1,598 surface acres would be open to leasable mineral development with standard terms and conditions.	Same impacts as described under the No Action Alternative, except 1,142,802 surface acres would be open to leasable mineral development, while a combined 880,043 acres would be managed as CSU or NSO. In all, 761,404 acres would be closed to leasable mineral development.	Same impacts as described under the No Action Alternative, except 1,089,481 surface acres would be open to leasable mineral development, while a combined 611,772 acres would be managed as CSU or NSO. 2,784,224 acres would be closed to leasable mineral development.	Same impacts as described under the No Action Alternative, except 1,750,774 surface acres would be open to leasable mineral development, and a combined 944,782 acres would be managed as CSU or NSO. In all, 88,502 acres would be closed to leasable mineral development.	Same impacts as described under the No Action Alternative, except 1,997,681 surface acres would be open to leasable mineral development, while a combined 701,776 acres would be managed as CSU or NSO. In all, 84,687 acres would be closed to leasable mineral development.

Summary of Impacts to Special Status Fish				
Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
In all, 13,435 acres would be managed as ACECs, including the 200 acres that would be designated as the Pecos Bluntnose Shiner Habitat ACEC, which would beneficially impact the Pecos bluntnose shiner and other special status other fish species that use the same habitat, such as Rio Grande shiner, gray redhorse, and blue sucker. The Black River and Delaware River would not be managed as part of the National Wild and Scenic River System, and would managed to retain their eligibility until a suitability determination is made in the RMP. The fewer acres managed as special designations, as compared to the action alternatives, would result in adverse impacts to fish due to surface-disturbance activities allowed on the non-designated acres.	In all, 495,042 acres would be designated as ACECs, including the Pecos Bluntnose Shiner Habitat ACEC. One segment (8.22 miles) of the Delaware River would be recommended as suitable for WSR designation as would one segment of the Black River. This would result in beneficial impacts to fish due to the increased restrictions for surface-disturbing activities within special designations.	In all, 561,433 acres would be designated as ACECs, including the Pecos Bluntnose Shiner Habitat ACEC. The Delaware River would not be recommended as suitable for inclusion in the WSR system; however, management prescriptions would be more protective of riparian habitat than as described under the No Action Alternative. The Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A.	In all, 98,562 acres would be designated as ACECs, including the Pecos Bluntnose Shiner Habitat ACEC. The Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A. The Delaware River would not be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative B. Adverse impacts to fish resources would be less than those described under the No Action Alternative.	In all, 28,894 acres would be designated as ACECs, including the Pecos Bluntnose Shiner Habitat ACEC. The Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A, except the area would be managed as open with major constraints (NSO) for leasable development. The Delaware River would not be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative B. Adverse impacts to fish resources would be less than those described under the No Action Alternative.

Summary of Impacts to Special Status Fish				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
In all, 50,671 acres would be designated as either VRM Class I or II. Special status fish would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	In all, 273,710 acres would be designated as either VRM Class I or II. Special status fish would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	In all, 357,802 acres would be designated as either VRM Class I or II. Special status fish would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	In all, 67,962 acres would be designated as either VRM Class I or II. Special status fish would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.	In all, 48,263 acres would be designated as either VRM Class I or II. Special status fish would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.

2.43 SUMMARY OF IMPACTS TO SPECIAL STATUS WILDLIFE

Summary of Impacts to Special Status Wildlife	
Impacts from Management Common to All	
Wildland Fire and Fuel	Wildland fire would be used to protect, maintain, and enhance wildlife resources. In general, wildland fire would lead to short-term adverse impacts and long-term beneficial impacts.
Visual Resources	In general, lands designated as VRM Classes I and II benefit special status wildlife because they are the most restrictive of surface-disturbing activities.
Minerals	Acres designated as open to minerals development could lead to adverse impacts; acres open with moderate constraints would adversely affect special status wildlife at a lesser magnitude that open acres; acres designated as closed, withdrawn, and open with major constraints would benefit special status wildlife because of restrictions on surface-disturbing activities.
Renewable Energy	Impacts on special status wildlife from renewable energy projects include short- and long-term displacement due to habitat removal and surface disturbance; habitat fragmentation, especially from linear aspects of projects such as power lines and pipelines; disruption of breeding and other sensitive activities due to human noise and disturbance; and reduction of available foraging habitat and available prey. Each of these impacts could result in decreased health of the individual and/or of the population. In addition to the impacts described above, wind energy projects can also directly impact bird and bat species by collision with turbine blades. The lesser prairie-chicken is thought to be especially sensitive to habitat loss, fragmentation, and the presence of vertical structures, as would occur with wind energy and associated power lines and roads.
Livestock Grazing	Livestock grazing could directly affect special status wildlife by competing for forage, or indirectly, through habitat degradation by the spread of invasive weeds, promoting the spread of mesquite, reducing local biodiversity or shifting species composition, and lowering local population densities for some species. The presence of fences can result in negative impacts on lesser prairie-chickens.

Summary of Impacts to Special Status Wildlife				
Impacts from Management Common to All Action Alternatives				
Lands with Wilderness Characteristics	In general, because of the emphasis place on managing lands with wilderness characteristics as natural, primitive, and providing solitude, actions defining these lands are beneficial for special status wildlife.			
Minerals	All aplomado falcon habitat would be open to minerals leasing leading to adverse impacts on that species.			
Impacts Varying Across Alternatives				
Fish and Wildlife				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
The Birds of Prey Grassland area, 349,355 acres, would be managed as an ACEC, which could prevent negative impacts on the special status wildlife species inhabiting that area associated with minerals development, OHV use, renewable energy development, and grazing.	Same as No Action Alternative.	Same as No Action Alternative.	Same as the No Action Alternative except 349,253 acres would be managed as Birds of Prey Grassland ACEC, resulting in more beneficial impacts for grassland special status species.	Same as the No Action Alternative except 349,282 acres would be managed as Birds of Prey Grassland ACEC, resulting in more beneficial impacts for grassland special status species.
Lands with Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Under the No Action Alternative, no CFO lands would be managed as lands with wilderness characteristics, with no beneficial impacts.	Beneficial impacts from managing 66,666 acres, including zero acres of aplomado falcon habitat, to maintain naturalness, providing habitat protection for special status wildlife species.	Beneficial impacts from managing 47,611 acres, including zero acres of aplomado falcon habitat, to maintain naturalness, providing habitat protection for special status wildlife species.	Beneficial impacts from managing 35,715 acres to maintain naturalness, providing habitat protection for special status wildlife species. No aplomado falcon habitat would be managed as LWC, with no benefits specific to the species.	Beneficial impacts from managing 4,348 acres to maintain naturalness, providing habitat protection for special status wildlife species. No aplomado falcon habitat would be managed as LWC, with no benefits specific to the species.

Summary of Impacts to Special Status Wildlife				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts from 50,671 acres subject to VRM Class I and II restrictions. No light stipulations would be established. Light pollution would continue to be a potential source of disturbance for special status wildlife.	Beneficial impacts from 273,710 acres subject to VRM Class I and II restrictions. Night lighting would be hooded or downward-facing, partially mitigating light-induced effects on special status wildlife.	Most beneficial impacts due to the greatest area (357,802 acres) subject to VRM Class I and II restrictions. All permanent lights in the Guadalupe Escarpment Scenic Area would be hooded or downward-facing, partially mitigate light-induced effects on special status wildlife.	Beneficial impacts from 67,962 acres subject to VRM Class I and II restrictions. All permanent lights in VRM Classes II and III would be hooded or downward-facing, partially mitigate light-induced effects on special status wildlife.	Least beneficial impacts due to smallest area (48,263 acres) subject to VRM Class I and II restrictions. There would be no requirements for lighting, which could lead to adverse impacts on special status wildlife.
Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Leasable: Potential for adverse impacts on 1% of aplomado falcon grasslands habitat, 0% of aplomado falcon grasslands boundary level 1, 2 and 3 habitat, 4% of suitable lesser prairie-chicken (LPC) habitat, 0% of LPC isolated population area, and 4% of the LPC timing restriction area, as well as 80% of dunes sagebrush lizard habitat open for leasing because of open designation or open designation with moderate constraints.	**Leasable:** Potential for adverse impacts on 1% of aplomado falcon grasslands habitat and <1% or 0% of aplomado falcon grasslands boundary level 1, 2, and 3 habitat, 4% of suitable LPC habitat, 0% of LPC isolate population area, and 3% of LPC timing restrictions area, as well as 80% of dunes sagebrush lizard habitat open for leasing because of open designation or open designation with moderate constraints.	**Leasable:** Potential for adverse impacts on 1% of aplomado falcon grasslands habitat, <1% or 0% of aplomado falcon grasslands boundary level 1, 2, and 3 habitat; 4% of suitable LPC habitat, 0% of LPC isolated population area, and 3% of LPC timing restriction area, as well as 0% of dunes sagebrush lizard habitat open for leasing because of open designation or open designation with moderate constraints.	**Leasable:** Potential for adverse impacts on 19% of aplomado falcon grasslands habitat, 1% or 0% of aplomado falcon grasslands boundary level 1, 2 and 3 habitat; 4% of suitable LPC habitat, 30% of LPC isolated population area, and 4% of LPC timing restriction area, as well as 80% of dunes sagebrush lizard habitat open for leasing because of open designation or open designation with moderate constraints.	**Leasable:** Potential adverse impacts on 19% of aplomado falcon grasslands habitat, and 1% or 0% of aplomado falcon grasslands boundary level 1, 2 and 3 habitat; 85 of suitable LPC habitat, 50% of LPC isolated population area, and 3% of LPC timing restriction area, as well as 98% of dunes sagebrush lizard habitat open for leasing because of open designation or open designation with moderate constraints.
Salable: Potential for adverse impacts on 99% of aplomado falcon grasslands habitat, and 0% of aplomado falcon grasslands boundary level 1, habitat and 99% or 100% of aplomado falcon grasslands boundary level 2, and 3 habitat; and 99% of suitable LPC habitat, 99% of LPC isolated population area, and 86% of LPC timing restriction area	**Salable:** Potential for adverse impacts on 1% of aplomado falcon grasslands habitat, <1% or 0% of aplomado falcon grasslands boundary level 1, 2, and 3 habitat; and 5% of suitable LPC habitat, <1% of LPC isolated population area, and 3% of LPC timing restriction area because of open designation, as well as 78% of dunes sagebrush lizard habitat because of open	**Salable:** Potential for adverse impacts on aplomado falcon grasslands habitat and aplomado grasslands boundary level 1, 2, and 3 habitat same as Alternative A; 5% of suitable LPC habitat, <1% of LPC isolated population area, and 3% of LPC timing restrictions area because of open designation, as well as 5% of aplomado falcon, 68% of suitable lesser prairie-	**Salable:** Potential for adverse impacts on 18% of aplomado falcon grasslands habitat, 1%, <1%, and 0% of aplomado falcon grasslands boundary level 1, 2, and 3 habitat; 4% of suitable LPC habitat, 31% of LPC isolated population area, 3% of LPC timing restriction area because of open designation, as well as 73% of dunes sagebrush lizard habitat	**Salable:** Potential for adverse impacts on 19% of aplomado falcon grasslands habitat, and aplomado grasslands boundary level 1, 2, and 3 habitat same as Alternative C; 8% of suitable LPC habitat, 50% of LPC isolated population area, and 2% of LPC timing restriction area because of open designation, as well as 96% of dunes sagebrush lizard habitat because of open

Summary of Impacts to Special Status Wildlife				
because of open designation, as well as 99% of dunes sagebrush lizard habitat because of open with standard terms and conditions. **Locatable:** Potential for adverse impacts on 99% of aplomado falcon grasslands habitat and 100% of aplomado falcon grasslands boundary level 1, 2, and 3 habitat; 99% of LPC suitable habitat, isolated population area, and timing restriction area, as well as 100% of dunes sagebrush lizard habitat because of open designation.	with standard terms and conditions. **Locatable:** Potential for adverse impacts on 99% of aplomado falcon grasslands habitat, as well as aplomado falcon grasslands boundary level 1 and 2 habitat, and 100% of aplomado falcon grasslands boundary level 3 habitat; 64% of suitable LPC habitat, 99% of LPC isolated population area, and 67% of LPC timing restriction area, as well as 79% of dunes sagebrush lizard habitat because of open designation.	chicken, and 28% of dunes sagebrush lizard habitat because of open with standard terms and conditions. **Locatable:** Potential for adverse impacts on aplomado falcon grasslands habitat and aplomado falcon grasslands boundary level 1, 2, and 3 habitat same as Alternative A; 12% of suitable LPC habitat, 57% of LPC isolated population area, and 3% of LPC timing restriction area, as well as 99% of dunes sagebrush lizard habitat because of open designation.	because of open with standard terms and conditions. **Locatable:** Potential for adverse impacts on 99% of aplomado falcon grasslands habitat and aplomado falcon grasslands boundary level 2 habitat and 100% of aplomado falcon grasslands boundary level 1 and 3 habitat; 81% of suitable LPC habitat, 99% of LPC isolated population area, and 86% of LPC timing restriction area, as well as 99% of dunes sagebrush lizard habitat because of open designation.	with standard terms and conditions. **Locatable:** Same as Alternative C.
Land Use Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse removal of habitat, surface disturbance, and habitat degradation due to open designation on 57% to 74% aplomado falcon habitat, including grasslands habitat and grasslands boundary levels 1 – 3 habitat, 67% to 82% of LPC habitat, including LPC suitable habitat, LPC isolated population area, and LPC timing restrictions, and 82% dunes sagebrush lizard habitat.	Fewer adverse impacts than the No Action Alternative because exclusion designation on 54% to 74% of aplomado falcon habitat, including grasslands habitat and grasslands boundary levels 1 – 3 habitat,17% of LPC suitable habitat and timing restriction area, as well as 1% of LPC isolated population area; and 57% dunes sagebrush lizard habitat.	Fewer adverse impacts than the No Action Alternative because exclusion designation on 56% to 74% of aplomado falcon habitat, including grasslands habitat and grasslands boundary levels 1 – 3 habitat, 62% of suitable LPC habitat, 37% of LPC isolated population area, and 67% of LPC timing restrictions habitat, as well as 17% of dunes sagebrush lizard habitat.	Fewer adverse impacts than the No Action Alternative because open designation on <1% to 6% of aplomado falcon grassland habitat, aplomado falcon grassland boundary level 2 and 3 habitat, as well as 58% of aplomado falcon grasslands boundary level 1 habitat. More adverse impacts than the No Action Alternative because open designation on 50% suitable LPC habitat and timing restriction area, as well as 80% of LPC isolated population area, and 64% dunes sagebrush lizard habitat.	Fewer adverse impacts than the No Action Alternative because open designation on 1% to 7% of aplomado falcon grassland habitat, aplomado falcon grassland boundary level 2 and 3 habitat, as well as 58% of aplomado falcon grasslands boundary level 1 habitat. More adverse impacts than the No Action Alternative because open designation on 50% suitable LPC habitat and timing restriction area, as well as 81% of LPC isolated population area, and 64% dunes sagebrush lizard habitat.

Summary of Impacts to Special Status Wildlife				
Renewable Energy				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Potential for mortality, habitat loss, and fragmentation due to renewable energy development.	Beneficial impacts from renewable energy development withdrawn from lands with wilderness characteristics, lesser prairie-chicken HAs, wetland and riparian areas, the Guadalupe Mountain face, aplomado falcon grasslands, critical habitat, and T&E habitat.	Same as Alternative A, except renewable development would be avoided (not withdrawn) in T&E habitat.	Same as Alternative B, except renewable development would also be avoided in aplomado falcon grasslands.	Same as Alternative B, except renewable development would also be avoided in aplomado falcon grasslands habitat.
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Grazing exclusion would have long-term beneficial effects on special status wildlife habitat in excluded areas. This alternative would have 5,226 acres closed to grazing.	This alternative would have the most beneficial impacts because of 493,120 acres excluded from grazing.	This alternative would have 153,583 acres excluded from grazing leading to beneficial impacts for special status species.	This alternative would have 8,115 acres excluded from grazing leading to beneficial impacts for special status species.	This alternative would have 3,594 acres excluded from grazing leading to the fewest beneficial impacts for special status species.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
55,966 acres would be closed to OHV use which could benefit special status wildlife species.	52,028 acres would be closed to OHV use which could cause more potential for adverse impacts to special status wildlife species than the No Action Alternative.	41,936 acres would be closed to OHV use which could cause more potential for adverse impacts to special status wildlife species than the No Action Alternative.	38,738 acres would be closed to OHV use which could cause more potential for adverse impacts to special status wildlife species than the No Action Alternative.	38,737 acres would be closed to OHV use which could cause more potential for adverse impacts to special status wildlife species than the No Action Alternative.
Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No new ACECs would be designated. Beneficial protection would occur on the existing 13,435 acres of existing ACECs, which does not include habitat for aplomado falcon, dunes sagebrush lizard, or lesser prairie-chicken.	Beneficial management of a total of 495,042 acres as ACECs. Special status wildlife occurring within this area could benefit from this action.	Beneficial management of a total of 561,433 acres as ACECs. Special status wildlife occurring within this area could benefit from this action.	Beneficial management of a total of 98,562 acres as ACECs. Special status wildlife occurring within this area could benefit from this action.	Beneficial management of a total of 28,894 acres as ACECs. Special status wildlife occurring within this area could benefit from this action.

2.44 SUMMARY OF IMPACTS TO WILDLAND FIRE AND FUELS MANAGEMENT

Summary of Impacts to Wildland Fire and Fuels Management				
Wildland Fire and Fuels Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Potential soil erosion due to removal of overstory and understory vegetation as a result of prescribed fires. Improved vegetation condition towards an FRCC of 1 through the use of other non-fire treatments (mechanical removal, chemical and biological treatments, manual removal, seeding). Smoke and air quality impacts to local receptors during prescribed burning.	Same as No Action.	Same as No Action.	Same as No Action.	Same as No Action.
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Reduced risk of large catastrophic wildfires through the removal of fine grasses in areas open to grazing. Increases in water availability for fire suppression due to the presence of stock tanks and ponds. Alteration to the vegetative community over 2,089,394 acres, including decreased species composition and decreased fuel loading and structure, both of which impact the potential to restore site conditions to a FRCC of 1.	Same as No Action Alternative, except moderately reduced alteration to the vegetative community of over 1,598,198 acres, improving potential to restore site conditions to FRCC 1 as compared to the No Action.	Same as No Action Alternative, except slightly reduced alteration to the vegetative community of over 1,937,725 acres improving potential to restore site conditions to FRCC 1 as compared to the No Action.	Same as No Action Alternative, except slightly reduced alteration to the vegetative community of over 2,083,232 acres reducing the potential to restore site conditions to FRCC 1 as compared to the No Action.	Same as No Action Alternative, except slightly reduced alteration to the vegetative community of over 2,087,759 acres reducing the potential to restore site conditions to FRCC 1 as compared to the No Action.

Summary of Impacts to Wildland Fire and Fuels Management				
Travel Management and Recreation				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Some risk of human ignitions due to OHV limited designations on 97% of the planning area.	Similar to No Action Alternative (OHV limited on 98% of the planning area).	Similar to No Action Alternative (OHV limited on 98% of the planning area).	Similar to No Action Alternative (OHV limited on 98% of the planning area).	Similar to No Action Alternative (OHV limited on 98% of the planning area).
Special Designation Decisions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Increased risk of human ignitions due to less than 1% of the planning area limiting access due to special designations.	Decreased risk of human ignitions compared to the No Action Alternative due to 24% of the planning area limiting access due to special designations.	Greater decreased risk of human ignitions compared to Alternative A due to 27% of the planning area limiting access due to special designations.	Increased risk of human ignitions compared to Alternatives A and B due to 5% of the planning area limiting access due to special designations.	Increased risk of human ignitions compared to Alternatives A, B, and C due to 1% of the planning area limiting access due to special designations.
Mineral Management				
No Action	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Increased risk of human ignitions related to increased access and or equipment related fires on 92% of the planning area open to leasable mineral management, 95% open to salable mineral management, and 99% open to locatable mineral management.	Same as No Action, except a reduced (70%) of the planning area open to leasable mineral management, 85% open to salable mineral management, and 86% open to locatable mineral management.	Same as No Action, except a reduced (55%) of the planning area open to leasable mineral management, 84% open to salable mineral management, and 76% open to locatable mineral management.	Same as No Action, except a slightly reduced (91%) of the planning area open to leasable mineral management, and slightly reduced 91% open to salable mineral management, and 95% open to locatable mineral management.	Same as No Action, except a slightly higher (94%) of the planning area open to leasable mineral management, 94% open to salable mineral management, and 96% open to locatable mineral management.

2.45 SUMMARY OF IMPACTS TO CULTURAL RESOURCES

Summary of Impacts to Cultural Resources	
Impacts from Management Common to All	
Cultural Resources	Compliance with all existing statutes, regulations, formal agreements, Executive Orders, and policies applicable to cultural resources, including the NHPA, NAGPRA, and existing treaties and trust agreements, would reduce opportunities for short- and long-term, adverse impacts to cultural resources. Requiring cultural resource assessments, which may include field investigations, prior to development at the project-specific level in compliance with Section 106 of the NHPA provides for long-term effects to cultural resources by creating opportunities to avoid, minimize, and mitigate adverse effects to individual resources.
Wildland Fire Management	Protection of cultural resources was incorporated into the CFO Fire Management Plan (BLM 2012), which would be implemented across all alternatives. The plan limits the use of fire retardants in areas of known rock art sites, which are susceptible to damage from the chemicals. Mechanical fuels treatments are limited to minimize potential disturbance of cultural resource sites, and decisions regarding response to wildland fire consider the protection of cultural resources as a decision factor. All of these actions positively impact cultural resources in the long-term by reducing or eliminating unnecessary disturbance of cultural sites.
Land Tenure	Retaining lands not identified for disposal affords the protection of federal laws, such as the National Historic Preservation Act, to cultural resources present on those lands. BLM-administered lands disposed of to non-federal entities may contain cultural resources that could be adversely impacted due to the removal of federal laws requiring consideration of those cultural resources in land development. However, the BLM must follow the Section 106 process and the policies outlined in other formal agreements and must identify and resolve any adverse effects to cultural resources before land can be disposed of to another party.
Land Use Authorizations	ROWs would be granted only after site-specific analysis and after following the Section 106 process by identifying historic properties, devising measures to avoid, minimize, or mitigate any adverse effects from ROW use. Authorizations of new land uses in previously undisturbed areas would continue across all alternatives per BLM policy and in accordance with the Section 106 process. With each area of new disturbance comes the risk of inadvertent adverse impacts to cultural resources not identified during the Section 106 process (e.g., sites that are buried and cannot be identified during pre-construction visual inspections for cultural resources).
Leasing – Oil and Gas, Minerals, and Non-Energy Solid Leasables	Leasing, regardless of resource type, poses risk of both direct and indirect impacts to cultural resources. Direct impacts typically occur through physical disturbance of cultural resources during project development. As noted above, these risks are offset by implementation of the Section 106 process and adherence to BLM policies and the Protocol Agreement, all of which obligate the BLM to project-level identification of historic properties that could be adversely affected by the proposed activity. Indirect impacts to cultural resources from leasing decisions typically occur through such actions as vandalism or looting resulting from increased human presence or erosion of sites created by adjacent surface disturbance.

Summary of Impacts to Cultural Resources	
Recreation	Designation and management of SRMAs and other recreation-emphasis areas focuses on managing user behavior in those areas. These designations are intended to direct and focus recreational activity to these areas. On the one hand, this focused activity increases the risk of both direct and indirect adverse impacts to cultural resources—including intentional vandalism and looting, unintentional damage, increased erosion, trampling of artifacts and features, and other effects, particularly along roads and trails in and around designated camping areas. On the other hand, proactive and careful management of the recreation areas—particularly in those areas focused on cultural resources—to educate users and direct activity away from sites reduces risks to cultural resources from user activities and can help to deter intentional and unintentional acts of vandalism.
Renewable Energy	Wind energy development would be restricted or excluded in archaeological districts and TCPs. Most of the planning area would be excluded from solar energy development based on the decisions from the Solar Programmatic EIS. These actions provide long-term beneficial impacts to cultural resources by eliminating one source of ground-disturbing activity that has the potential to damage cultural resources.
Minerals Allocations	Placement of major constraints—essentially no surface occupancy—for minerals development in portions of the planning area would result in long-term benefits for cultural resources in those areas compared to areas with fewer surface occupancy constraints. Beneficial impacts to cultural resources would include: a decreased risk of physical disturbance due to surface activities and fewer visual and auditory intrusions.
Special Designations	Designation and management of ACECs and CRMAs to protect environmental and cultural resources provides long-term beneficial impacts to cultural resources by placing restrictions on surface-disturbing activities and development with the potential to damage such resources. The magnitude of the effects varies by alternative relative to the number of acres on which restrictions are placed; these differences are discussed in more detail below. Closing WSAs to mineral leasing and managing them for VRM Class I conditions would have long-term indirect benefits on cultural resources by reducing risks of direct physical disturbance of sites but would also restrict opportunities for scientific research into those sites and limit the benefits such research provides to the public and to resources managers.
Travel Management	Cross-country OHV travel would be limited to wildland fire suppression activities, emergency response situations, and activities related to the administration of a BLM permit. Cross-country OHV travel for recreation, hunting, and fishing would no longer be permissible. This would have an overall beneficial impact to cultural resources, insofar as it would limit the number of user-created trails passing over or within proximity to archaeological sites and reduce a source of physical disturbance to those sites.
Vegetation	Mechanical and chemical treatments would be used to manage vegetation to desirable conditions in the CFO. Such actions increase risk of long-term adverse effects to cultural sites from physical disturbance and chemical damage to artifacts, rock art, and similar cultural materials. However, all proposed mechanical treatments would be subject to Section 106 review prior to implementation. This process would help offset the risk of physical disturbance posed to cultural resources from such treatments.
Visual Resource Management	Designation and management of WSAs and certain ACECs as VRM Class I would reduce risks of direct and indirect adverse impacts to cultural resources within those areas because surface-disturbing activities are limited. This would result in potential long-term, beneficial impacts to cultural resources.

Summary of Impacts to Cultural Resources	
Impacts from Management Common to All Action Alternatives	
Cave and Karst Resources	See Special Designations.
Land Tenure	Cultural resources are frequently found in conjunction with natural freshwater sources. Additionally, natural waters are often considered sacred by Native American tribes affiliated with the planning area and may be considered TCPs. Closing all BLM springs and seeps to saleables and mineral disposal and withdrawal of the same from locatable minerals would provide for long-term benefits to cultural resources. These actions would reduce sources of surface disturbance that can directly and adversely impact cultural resources. Land exchanges (to acquire lands or interest in lands) would prioritize acquiring lands with, among other resources, cultural resources determined to be unique or of traditional or scientific importance. Land exchanges would also prioritize lands needed to protect environmental resources—including cultural resources—on existing BLM-administered lands. Placement of lands under BLM management subjects them to considerations and protections under federal law (e.g., the NHPA). If acquired lands are not already federally owned prior to acquisition, extending federal cultural resource management laws to them creates long-term indirect benefits for cultural resources.
Livestock Grazing	The placement of livestock infrastructure (e.g., water developments, fences, and corrals) would be avoided in all archaeological districts, thus reducing, though not eliminating, a source of long-term adverse effects to historic properties from surface disturbance. Similarly, new fences would only be allowed in archaeological districts in previously disturbed areas, where the risk of adverse effects to historic properties is low.
Recreation	Prohibitions on camping within 900 feet of any natural water source (excluding the Pecos River) would have long-term beneficial impacts to cultural resources that may be present at such locations, by reducing potential risks from looting, vandalism, and inadvertent damage. Archaeological sites are often found near natural water sources, and so this kind of camping prohibition would be particularly effective in protecting cultural resources. All action alternatives would prohibit rock climbing routes within petroglyph sites, thereby protecting these sites from rock-climbing impacts such as panel damage and destruction. Black River, Hackberry Lake OHV Area, Conoco Lake, and La Cueva Trails would be designated as SRMAs. Non-motorized use would either be closed or restricted to existing routes in all of these areas Such measures reduce risk to cultural resources for long-term direct adverse impacts from surface disturbance, trampling, vandalism, and looting unless existing routes pass through, directly adjacent to, or lead to cultural resource sites.
Renewable Energy	Restrictions would be placed on renewable energy development within established archaeological districts and in close proximity to TCPs. These measures reduce the risk of long-term adverse impacts to cultural resources from surface disturbance or visual or auditory intrusion by minimizing development and aboveground structures.
Special Designations	Management of the Lonesome Ridge ACEC (including, for example, excluding future ROWs; withdrawing from mining claim location and mineral material disposal; limiting motorized vehicle use, oil and gas exploration, and renewable energy development; and managing for VRM Class I objectives) would provide long-term indirect benefits to cultural resources. This management strategy would limit surface-disturbing activities and the introduction of aboveground structures that could directly disturb or indirectly intrude upon cultural sites. Management of 7,086 acres as WSAs (with limitations on surface disturbance, grazing, travel, and similar actions) provide for similar positive effects to cultural resources.

Summary of Impacts to Cultural Resources				
Impacts Varying Across Alternatives				
Land Use Authorizations – Acres of Right-of-Way Avoidance and Exclusion in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
489,016	236,068	252,957	128,151	78,887
Livestock Grazing – Acres Open to Grazing in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
507,481	420,562	453,764	503,684	506,854
Livestock Grazing – Acres Closed to Grazing in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
1,365	88,295	55,084	5,174	2,007
Minerals Allocations – Fluid Leasable Minerals – Acres Open with Standard Terms and Conditions in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
441,754	337,336	316,843	401,053	481,895
Minerals Allocations – Fluid Leasable Minerals – Acres Open with Moderate Constraints in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
50,232	131,565	74,781	182,477	119,863
Minerals Allocations – Fluid Leasable Minerals – Acres Open with Major Constraints in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
24,006	35,827	82,645	46,219	29,606
Minerals Allocations – Fluid Leasable Minerals – Acres Closed in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
22,191	133,421	163,873	8,395	6,790
Minerals Allocations –Leasable Minerals – Estimated Acres of Surface Disturbance in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
5,758	3,580	2,670	5,843	6,067
Minerals Allocations – Salable Minerals –Acres Open in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
601,848	157,323	328,903	415,651	492,405

Summary of Impacts to Cultural Resources				
Minerals Allocations – Salable Minerals –Acres of Avoidance in High Cultural Sensitivity Areas				
No Action	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0	348,317	107,786	164,819	108,216
Minerals Allocations – Salable Minerals –Acres Closed in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
36,198	132,507	204,456	57,649	67,489
Minerals Allocations – Locatable Minerals –Acres Open to Entry in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
623,537	531,565	473,320	600,291	604,602
Minerals Allocations – Locatable Minerals –Acres Withdrawn from Entry in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
14,650	106,563	164,805	37,840	33,495
Lands with Wilderness Characteristics –Acres in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0	7,750	6,302	2,917	1,042
Recreation –Acres of SRMA and ERMA Management in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
35,25	24,490	32,778	32,344	28,856
Renewables –Acres Open in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
282,664	705,332	657,968	732,288	823,592
Renewables –Acres of Avoidance in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
273,554	96,594	65,482	179,308	159,302
Renewables –Acres Excluded in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
463,036	343,814	422,545	234,085	162,801
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Open to Leasable Minerals with Standard Terms and Conditions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
1,436	20,597	20,647	8,436	0

Summary of Impacts to Cultural Resources				
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Open to Leasable Minerals with Moderate Constraints				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0	830	852	6,449	0
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Open to Leasable Minerals with Major Constraints				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
4,249	10,711	44,054	9,944	1,485
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Closed to Leasable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
376	52,998	47,746	5,743	3,831
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Open to Salable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0	20,598	21,522	8,462	280
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Open to Salable Minerals with Moderate Constraints				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0	24,840	19,549	6,345	0
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Closed to Salable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
6,061	39,700	72,229	15,764	5,035
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Open to Locatable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
71	57,555	56,902	12,992	0
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Recommended for Withdrawal from Locatable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
5,990	27,561	54,698	15,686	5,036
Special Designations –Acres in ACECs in High Cultural Sensitivity Areas that are Withdrawn/Closed from Locatable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0	0	0	0	0
Travel Management – Acres OHV Limited in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
496,772	499,560	502,633	503,067	503,067

Summary of Impacts to Cultural Resources				
Travel Management – Acres Closed to Travel in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
12,051	9,288	6,215	5,780	5,780
Visual Resources – Acres Managed with VRM Class I and II Surface Disturbance Restrictions in High Cultural Sensitivity Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
31,268	59,090	84,128	27,174	19,535

2.46 SUMMARY OF IMPACTS TO PALEONTOLOGICAL RESOURCES

Summary of Impacts to Paleontological Resources	
Impacts from Management Common to All	
Paleontological Resources	Impacts to paleontological resources from management common to all alternatives have not been identified.
Wildland Fire Management	Impacts to paleontological resources from management common to all alternatives have not been identified.
Livestock Grazing	Actions related to livestock grazing under all alternatives could have long-term direct and indirect adverse impacts on paleontological resources. If grazing occurs in areas containing occurrences of surface fossils, livestock could adversely affect paleontological resources. Managing livestock grazing to improve or maintain desired range conditions would maintain vegetative cover and soil stability, and thereby prevent the indirect exposure and deterioration of paleontological resources.
Recreation	Promoting and managing recreation throughout the planning area could increase incidental or purposeful disturbance of paleontological resources. Unauthorized disturbance would result in displacement or loss of the paleontological resource involved.
Travel Management	Impacts from management common to all alternatives for travel management would not impact paleontological resources.
Land Use Authorizations	Land use authorizations, specifically major (intrastate pipeline or transmission) and minor (roads, power lines, and pipelines for oil and gas fields) ROWs, are subject to project-specific NEPA compliance, including an assessment of potential impacts to paleontological resources, prior to authorization. This would beneficially impact paleontological resources.
Visual Resources	Impacts from management common to all alternatives for visual resources would not impact paleontological resources.
Mineral Resources	Impacts from management common to all alternatives for mineral resources would not impact paleontological resources.
Special Designations	Management of special designations would have beneficial impacts on paleontological resources by reducing the risk of surface disturbance.
Renewable Energy	Impacts to paleontological resources from management common to all alternatives have not been identified.
Land Tenure	Impacts to paleontological resources from management common to all alternatives have not been identified.
Lands with Wilderness Characteristics	Impacts to paleontological resources from management common to all alternatives have not been identified.

Summary of Impacts to Paleontological Resources	
Impacts from Management Common to All Action Alternatives	
Paleontological Resources	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Wildland Fire Management	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Livestock Grazing	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Recreation	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Travel Management	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Land Use Authorizations	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Visual Resources	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Mineral Resources	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Special Designations	A management decision to designate Cave Resources as an ACEC would help preserve the integrity of the fossil deposits, while a decision not to designate would remove protection, potentially exposing the fossils to damage and loss.
Renewable Energy	Although paleontological resources vary in occurrence and density by site, impacts on these resources can be offset through project specific assessment and mitigation, because these actions would ensure that potential impacts are identified and addressed.
Land Tenure	According to general guidance for land tenure transactions acquiring land with known paleontological importance is a priority for acquisition in all of the action alternatives. This would beneficially impact paleontological resources because of the protective measures offered under federal ownership.
Lands with Wilderness Characteristics	Impacts to paleontological resources from management common to all action alternatives have not been identified.
Vegetation and Riparian Resources	Impacts to paleontological resources from management common to all action alternatives have not been identified.

Summary of Impacts to Paleontological Resources				
Impacts Varying Across Alternatives				
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Percent of planning area Open to Grazing – 99.7%. Impacts could be both adverse and beneficial to paleontological resources.	Percent of planning area Open to Grazing – 76.4%. Impacts could be both adverse and beneficial to paleontological resources.	Percent of planning area Open to Grazing – 92.7%. Impacts could be both adverse and beneficial to paleontological resources.	Percent of planning area Open to Grazing – 99.6%. Impacts could be both adverse and beneficial to paleontological resources.	Percent of planning area Open to Grazing – 99.8%. Impacts could be both adverse and beneficial to paleontological resources.
Recreation				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Total SRMAs and ERMAs – 69,469 acres regulated recreational use of areas tends to provide better protection to paleontological resources than does unregulated use. Although collecting common invertebrate and plant fossils for personal, non-commercial use is an accepted, low-impact use of public lands, which could foster a greater overall appreciation for paleontological resources and their scientific significance.	Impacts would be the same as described under No Action alternative, except 52,966 acres would be managed as SRMAs and ERMAs.	Impacts would be the same as described under No Action alternative, except 76,552 acres would be managed as SRMAs and ERMAs.	Impacts would be the same as described under No Action alternative, except 63,971 acres would be managed as SRMAs and ERMAs.	Impacts would be the same as described under No Action alternative, except 59,129 acres would be managed as SRMAs and ERMAs.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Zero acres open to OHV travel, 55,966 acres closed to OHV, and 2,035,307 acres designated as OHV limited.	Zero acres open to OHV travel, 52,028 acres closed, and 2,039,299 OHV limited.	Reduced impacts due to zero acres open to OHV travel, 41,936 acres closed, and 2,049,391 OHV limited.	Reduced impacts due to zero acres open to OHV travel, 38,738 acres closed, and 2,052,582 OHV limited.	Reduced impacts due to zero acres open to OHV travel, 38,737 acres closed, and 2,052,584 OHV limited.

Summary of Impacts to Paleontological Resources				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Percent of VRM Class I and II – 2%. VRM decisions that control and limit surface disturbance would reduce the risk of impacts to paleontological resources.	Impacts would be the same as described under the No Action Alternative, except 10% of BLM lands would be managed as VRM Classes I or II.	Impacts would be the same as described under the No Action Alternative, except 13% of BLM lands would be managed as VRM Classes I or II.	Impacts would be the same as described under the No Action Alternative, except 2% of BLM lands would be managed as VRM Classes I or II.	Impacts would be the same as described under the No Action Alternative, except 2% of BLM lands would be managed as VRM Classes I or II.
Mineral Resources – Leasable Minerals (acres of PFYC Classes 3 and 4)				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
471,590 acres – Open with standard terms and conditions	213,852 acres – open with standard terms and conditions	213,977 acres – open with standard terms and conditions	487,212 – open with standard terms and conditions	539,651 acres – open with standard terms and conditions
Special Designations – ACECs				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
13,435 acres managed as ACECs would benefit paleontological resources due to reduced surface disturbance in these areas.	495,042 acres managed as ACECs. Impacts are the same as described under the No Action Alternative.	561,433 acres managed as ACECs. Impacts are the same as described under the No Action Alternative.	98,562 acres managed as ACECs. Impacts are the same as described under the No Action Alternative	28,894 acres managed as ACECs. Impacts are the same as described under the No Action Alternative
Renewable Energy Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
The greater number of acres open to renewable energy development, the more likely paleontological resources would be adversely impacted. Geo open – 271,316 acres Solar open – 271,316 acres Wind open – 1,134,948 acres	The impacts would be the same as described under the No Action Alternative. Geo open – 473,252 acres Solar open – 1,323,157 acres Wind open – 800,762 acres	The impacts would be the same as described under the No Action Alternative. Geo open – 408,745 acres Solar open – 1,257,870 acres Wind open – 760,560 acres	The impacts would be the same as described under the No Action Alternative. Geo open – 564,267 acres Solar open – 1,356,451 acres Wind open – 1,002,986 acres	The impacts would be the same as described under the No Action Alternative. Geo open – 571,756 acres Solar open – 1,460,801 acres Wind open – 1,092,311 acres

Summary of Impacts to Paleontological Resources				
Land Tenure				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Disposal of BLM-administered surface through sales, exchanges, or any other title transfer with known or previously undocumented paleontological resources to private ownership would have long-term adverse impacts to paleontological resources because of the lack of protective measures for privately owned land, as well as by removing scientifically significant fossils from the public domain, thus rendering them permanently unavailable for scientific research and education. 218,318 acres would be disposed.	Impacts would be same for the No Action Alternative, except 18,703 acres would be disposed.	Impacts would be same for the No Action Alternative, except 26,125 acres would be disposed.	Impacts would be same for the No Action Alternative, except 31,536 acres would be disposed.	Impacts would be same for the No Action Alternative, except 51,579 acres would be disposed.
Lands with Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
0 acres would be managed as Lands with Wilderness Characteristics (LWC).	66,666 acres would be managed as LWC. Prescriptions for lands with wilderness characteristics would generally have long-term beneficial impacts on paleontological resources that occur within their boundaries because these lands would be managed to protect their wilderness values by reducing the potential for surface disturbance.	Impacts would be the same as described under Alternative A, except 47,611 acres would be managed as LWC.	Impacts would be the same as described under Alternative A, except 5,119 acres would be managed as LWC.	Impacts would be the same as described under Alternative A, except 1,221 acres would be managed as LWC.

2.47 SUMMARY OF IMPACTS TO LANDS WITH WILDERNESS CHARACTERISTICS

Summary of Impacts to Lands with Wilderness Characteristics				
Impacts from Management Common to All				
There is no management common to all alternatives.				
Impacts from Management Common to All Action Alternatives				
There is no management common to all action alternatives.				
Impacts Varying Across Alternatives				
Resource/Use				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No lands within the CFO would be managed as lands with wilderness characteristics.	11 areas (66,666 acres) would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.	9 areas (47,611 acres) would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. 2 areas (18,964) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics.	3 areas (5,119 acres) would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. 7 areas (54,727) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. 1 area (6,730 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics.	2 areas (1,212 acres) would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. 3 areas (19,483) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics 6 areas (45,872 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics.

Summary of Impacts to Lands with Wilderness Characteristics				
Mineral Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Leasable minerals: 39,095 acres would be open with standard terms and conditions, 9,126 acres open with major constraints, 17,302 open with moderate constraints, and 1,139 acres closed. Salable minerals: 56,394 acres would be open with standard terms and conditions and 10,265 acres closed to salable minerals. Locatable minerals: 65,480 acres open and 1,180 acres would be recommended for withdrawal.	Leasable minerals: development would be closed on 66,661 acres. Salable minerals: 1 acre would be open with standard terms and conditions, 2 acres would be open with special terms and conditions, and 66,569 acres closed to salable minerals. Locatable minerals: 2 acres open and 65,650 acres would be recommended for withdrawal.	Leasable minerals: development would be closed on 66,571 acres. Salable minerals: 10 acres would be open with standard terms and conditions, 18,955 acres would be open with special terms and conditions, and 47,607 acres closed to salable minerals. Locatable minerals: 18,965 acres open and 47,603 acres would be recommended for withdrawal.	Leasable minerals: 6,095 acres would be open with standard terms and conditions, 42,488 acres open with moderate constraints, 16,766 acres open with major constraints, and 1,220 acres closed. Salable minerals: 6,082 acres would be open with standard terms and conditions, 51,000 acres open with special terms and conditions, and 9,484 acres closed to salable minerals. Locatable minerals: 61,449 acres open and 5,115 acres would be recommended for withdrawal.	Leasable minerals: 55,716 acres would be open with standard terms and conditions, 1,370 acres would be open with moderate constraints, 8,354 acres open with major constraints, and 1,220 acres closed. Salable minerals: 55,716 acres would be open with standard terms and conditions and 9,570 acres closed to salable minerals. Locatable minerals: 65,441 acres open and 1,221 acres would be recommended for withdrawal.
Renewable Energy				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Solar energy development would be variance on 7,407 acres and excluded on 59,248 acres. Wind energy development would be open on 11,915 acres, designated as an avoidance area on 46,254 acres, and excluded on 8,504 acres.	Solar renewable energy development would be variance on 2,119 acres and excluded on 64,535 acres. Wind renewable energy development would be excluded on 66,661 acres.	Solar renewable energy development would be open on 2,129 acres and excluded on 64,525 acres. Wind renewable energy development would be excluded on 66,651 acres.	Solar renewable energy development would be open on 8,200 acres and excluded on 58,450 acres. Wind renewable energy development would be open on 6,081 acres, designated as an avoidance area on 12,004 acres, and excluded on 48,481 acres.	Solar renewable energy development would be open on 27,255 acres and excluded on 39,400 acres. Wind renewable energy development would be open on 8,215 acres and designated as an avoidance area on 57,208 acres, and excluded on 1,221 acres.

Summary of Impacts to Lands with Wilderness Characteristics				
Land Use Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Areas would be designated as open on 63,754 acres and as avoidance area on 2,904 acres for ROWs.	Lands with wilderness characteristics units would be designated as ROW exclusion areas on 66,661 acres.	Lands with wilderness characteristics units would be designated as ROW exclusion areas on 66,560 acres and open to ROWs on 10 acres.	Lands with wilderness characteristics units would be designated as ROW exclusion areas on 9,484 acres and ROW avoidance areas on 51,000 acres.	Lands with wilderness characteristics units would be designated as ROW exclusion areas on 1,220 acres, ROW avoidance areas on 18,850 acres, and open to ROWs on 21,461 acres.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
OHV travel, fire suppression, and geophysical exploration would be limited to existing trails on 66,654 acres.	Travel would be OHV limited on 66,573 acres and closed on 82 acres within all lands with wilderness characteristics.	Travel would be OHV limited on 66,573 acres and closed on 82 acres within all lands with wilderness characteristics.	Travel would be OHV limited on 66,573 acres and closed on 82 acres within all lands with wilderness characteristics.	Travel would be OHV limited on 66,573 acres and closed on 82 acres within all lands with wilderness characteristics.
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Grazing would be open on 66,655 acres.	Grazing would be open on 19,163 acres of lands with wilderness characteristics units, and closed on 47,488 acres of lands with wilderness characteristics units.	Grazing would be open on 47,625 lands with wilderness characteristics units, and closed on 19,026 acres of lands with wilderness characteristics units.	Grazing would be open on all lands with wilderness characteristics units (66,655 acres).	Grazing would be open on all lands with wilderness characteristics units (66,655 acres).

2.48 SUMMARY OF IMPACTS TO VISUAL RESOURCES

Summary of Impacts to Visual Resources	
Impacts from Management Common to All	
Visual Resources	Designation of VRM Class objectives to all BLM-administered public lands areas within the CFO. VRM Class I and Class II objectives would have beneficial impacts by permitting no visible or minor changes to scenic quality. VRM Class III and Class IV objectives would have adverse impacts by permitting moderate or major changes to scenic quality.
Mineral Resources	Exploration, development, and extraction of mineral resources would have adverse impacts on scenic values by creating long term surface disturbances adjacent to lands being protected under VRM Class I and Class II visual objectives. The long-term result would be a decline in visual values and scenic quality.
Wildland Fire	Short-term adverse impacts from vegetation loss and scorched surfaces contrasts created in burned areas; long-term beneficial impacts from vegetation regrowth that creates color, form, line, and texture contrasts. Beneficial impacts from increased sensitivity of public to burned areas.
Land Use Authorizations	Long-term, adverse impacts from reduction in scenic quality from surface disturbances, infrastructure construction on the surrounding landscape.
Special Designations (ACECs)	Long-term, beneficial impacts from preservation of natural scenic values. Preservation of landscapes would beneficially enhance public sensitivity of these areas.
Recreation	Beneficial impacts from maintaining and creating SRMAs that restrict OHV use and surface disturbances, preserve scenic quality, and limit infrastructure development in recreation areas. Adverse impacts in SRMAs that permit cross-country OHV travel, permit surface disturbances, and permit loss of scenic quality.
Livestock Grazing	Beneficial impacts from closing areas to grazing that would reduce vegetation loss, soil erosion, and weedy growth; adverse impacts in open areas that would increase these impacts.
Riparian	Prohibition or restriction of OHV use in riparian areas would be beneficial for visual resources by preserving scenic quality in sensitive riparian areas.
Vegetation	Adverse impacts the same as Wildland Fire above. Beneficial impacts from maintaining and improving wildlife habitat, and enhancing scenic quality.
Impacts from Management Common to All Action Alternatives	
Visual Resources	Long-term, beneficial impacts from management actions under all action alternatives that would reduce visual contrasts.
Renewable Energy	Wind energy development in existing developed areas or areas planned for development would be beneficial to scenic quality by concentrating surface disturbances in areas where VRM objectives permit moderate and major disturbances.

Summary of Impacts to Visual Resources				
Impacts Varying Across Alternatives				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts from protection of 1.8% of area under VRM I and II; adverse impacts from designation of remaining 98.2% under VRM III and IV.	Beneficial impacts from protection of 9.8% under VRM I and II; adverse impacts from designation of remaining 90.2% under VRM III and IV.	Beneficial impacts from protection of 12.8% under VRM I and II; adverse impacts from designation of remaining 87.2% under VRM III and IV.	Beneficial impacts from protection of 2.4% under VRM I and II; adverse impacts from designation of remaining 97.6% under VRM III and IV.	Beneficial impacts from protection of 1.7% under VRM I and II; adverse impacts from designation of remaining 98.3% under VRM III and IV.
Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long-term, adverse impacts from reduction in scenic quality by surface disturbances, infrastructure, roads, well heads, and pipelines.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.
Land Managed to Protect Wilderness Character				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse impacts from loss of undisturbed landscapes, loss of scenic quality, and visual sensitivity for these areas diminished.	Beneficial impacts from scenic quality preservation and increased public sensitivity of scarcity of undisturbed landscapes	Same as Alternative A.	Same as Alternative A.	Same as No Action Alternative
Backcountry Byways				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts from preservation of landscape and scenic quality under VRM Class II along Guadalupe Byway.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Adverse impacts on visual resources from VRM Class III designation along byway that would permit moderate scenic degradation.

Summary of Impacts to Visual Resources				
Adverse impacts to Dark Canyon scenic quality from no designation as Backcountry Byway and management under VRM Class III and Class IV.	Beneficial impacts from designation as Dark Canyon Backcountry Byway and scenic management of 2-mile buffer under VRM Class II.	Same as Alternative A.	No designation. Beneficial scenic quality protection from management of foreground 0.5-mile buffer along road under VRM Class II objectives.	No designation. Adverse impacts to scenic quality from management of road with 1-mile buffer under VRM Class III for moderate surface disturbances.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts to scenic quality from OHV limited and closed areas that would reduce surface disturbances.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.
Fish and Wildlife				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Management actions would degrade scenic quality within Birds of Prey area from renewable energy development, and minerals leasing.	Designation as ACEC would reduce surface disturbances and enhance scenic quality.	Same as Alternative A.	Same as No Action Alternative.	Same as No Action Alternative.

2.49 SUMMARY OF CUMULATIVE IMPACTS OF MINERAL ACTIONS ON AIR QUALITY

Summary of Cumulative Impacts of Mineral Actions on Air Quality				
Far-Field Modeling Analyses				
Carbon Monoxide				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
1-hour and 8-hour impacts below NAAQS/NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/NMAAQS.

Summary of Cumulative Impacts of Mineral Actions on Air Quality				
Nitrogen Oxides				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.
Ozone				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
10 of 31 monitoring sites had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitoring sites had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitoring sites had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitoring sites had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitoring sites had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).
PM10				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.
PM2.5				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
2 of 11 monitoring sites had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX. vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX. vs. 12 $\mu g/m^3$ standard).	2 of 11 monitoring sites had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX. vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX. vs. 12 $\mu g/m^3$ standard).	2 of 11 monitoring sites had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX. vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX. vs. 12 $\mu g/m^3$ standard).	2 of 11 monitoring sites had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX. vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX. vs. 12 $\mu g/m^3$ standard).	2 of 11 monitoring sites had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX. vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX. vs. 12 $\mu g/m^3$ standard).

Summary of Cumulative Impacts of Mineral Actions on Air Quality				
Sulfur Dioxide				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
1-hour impacts above the NAAQS (maximum 16 times the 196 µg/m^3 standard in Amarillo, TX). 3-hour, 24-hour, and annual impacts below NAAQS.	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 µg/m^3 standard in Amarillo, TX).	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 µg/m^3 standard in Amarillo, TX).	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 µg/m^3 standard in Amarillo, TX).	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 µg/m^3 standard in Amarillo, TX).
Visibility at Class I Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
366 days (leap year) of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.
Visibility at Sensitive Class II Areas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.
Nitrogen Deposition				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).
Sulfur Deposition				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).

Summary of Cumulative Impacts of Mineral Actions on Air Quality				
Lake Acid Neutralizing Capacity				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Above the LAC for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).

2.50 SUMMARY OF IMPACTS TO LEASABLE MINERAL RESOURCES

Summary of Impacts to Leasable Mineral Resources	
Management Actions with No Impacts or Minor Impacts	
Backcountry Byways	Designations of backcountry byways would have a minor adverse impact on leasable mineral development because proposed backcountry byways under all alternatives are in an area of low mineral development potential.
Cave and Karst	There are no cave and karst management decisions considered in Chapter 2 that would impact leasable minerals.
Cultural Resources	Continuation of the Permian Basin Programmatic Agreement would occur under all alternatives. Some policies may cause minor delays in mineral development to allow for surveys and/or agency consultation.
Lands Managed to Protect Wilderness Characteristics	Most of the areas identified as lands managed to protect wilderness characteristics under all alternatives would be outside the area with known low, moderate, or high potential for oil and gas, so fluid leasable minerals would not be impacted. There would be no impact on geothermal resources, because there is no potential for geothermal resources in areas proposed to be managed for their wilderness characteristics. Areas with wilderness characteristics are also outside the area with known low, moderate, or high potential for potassium, so potassium development would not be impacted. The existing sodium mines would also not be impacted, and no new underground sodium or sulfur mines are projected for the planning period.
Livestock Grazing	The standards for rangeland health apply to reclamation of all leasable mineral operations in the planning area; however, these standards would not significantly increase the constraints placed leasable mineral operations nor affect leasing or the number of wells.
Locatable Minerals	Locatable mineral mining operations would conflict with the location of leasable mineral operations; however, the low potential for development for locatable mineral deposits and the projection of only one locatable mineral operation during the planning period make the likelihood of conflict very remote.
Paleontological Resources	None of the paleontological resources decisions would impact the amount of land available for leasing or the number of leasable mineral operations.
Public Health and Safety	Requirements to upgrade visual and audible alarm systems for wells with concentrations of H_2S greater than 100 ppm would protect public health and safety without being cost-prohibitive.

Summary of Impacts to Leasable Mineral Resources	
Renewable Energy	The wind energy development potential area is in the vicinity of the Guadalupe Mountains where there is little or no potential for leasable mineral resources. Solar energy development could occur across Eddy and Lea Counties, so conflicts with leasable mineral operations could occur. However, the acreage needed for solar development would be minimal relative to the BLM-administered lands available for leasable mineral development.
Riparian	There are no riparian management decisions considered in Chapter 2 that would impact leasable minerals.
Salable Minerals	Typically, salable operations are part of the infrastructure that helps support oil and gas operations or solid leasable mine operations. Thus, the salable mineral decisions would have a beneficial effect for leasable mineral development.
Soils	There are no soil resource management decisions considered in Chapter 2 that would impact leasable minerals.
Special Status Species	There are no special status species management decisions considered in Chapter 2 that would impact leasable minerals.
Travel Management	Implementation of a comprehensive travel management plan would have a beneficial effect on leasable mineral development because it would identify roads that would be available for access up front so these routes can be projected during the cost estimation phase of operation planning. Travel management decisions would affect leasable mineral development because access roads for exploration and development can be closed or their use restricted or limited temporarily. This would cause the costs of operations to increase or, in rare cases, prohibit the operations. These actions would directly impact access to mineral deposits or limit the type of vehicular traffic to access the deposits, which constrains and increases the costs of leasable mineral operations. However, typically access routes that coincide with existing roadways or access roads are authorized under the lease or permit.
Vegetation Management, Including Noxious Weeds	No vegetation management decisions under the alternatives for this RMP change or impact the availability of leasable mineral leases or the numbers of wells or operations. Thus, vegetation management decisions would have no impact on leasable mineral development.
Water Resources	There are no water resource management decisions considered in Chapter 2 that would impact lands available for mineral leases or the number of wells or operations.
Wildland Fire Management	There are no wildland fire management decisions considered in Chapter 2 that would impact lands available for mineral leases or the number of wells or operations.
Fish and Wildlife	There are no wildlife and fish management decisions considered in Chapter 2 that would impact leasable minerals.
Impacts from Management Common to All	
Leasable Minerals	The BLM would continue to require mineral lessees to conduct operations in a manner that would minimize adverse impacts to other resources, land uses, and land users in accordance with regulations, orders, notices to lessees, lease stipulations, COAs, and BMPs. Impacts to mineral development include the relocation of drilling operations, the use of other drilling methods such as directional drilling, and timing delays. In many cases, these would be considered typical costs of doing business on public lands. Depending on market conditions for leasable minerals, higher costs may increase the sales prices that operators charge purchasers, limit mineral development to only the more profitable portions of a mineral deposit, or reduce the overall amount of exploration and development.
Air Resources	Under all alternatives, oil and gas production facilities must comply with existing federal and state regulatory requirements for the protection of ambient air quality. The requirements would result in an adverse impact because it would increase management constraints placed on operations.

Summary of Impacts to Leasable Mineral Resources	
Land Tenure	Disposals would have no impact on the availability of land for leasing and, thus, no impact on leasable mineral development.
Land Authorizations	Exclusions and avoidance decisions would have an indirect adverse impact on mineral development depending on how much acreage and how many wells are impacted.
Recreation	Mitigation measures such as the pump jack muffler requirement for all compressors within 1 mile of the Conoco Lake SRMA and H_2S alarms for new leases in the Dunes RMZ would have minimal adverse impacts to mineral development. There would be NSO on active dunes and developed areas for new leases. Open dune lands make up only 3,300 acres of BLM-administered land in the planning area,
Special Designations	WSAs would be closed to leasing and existing leases would not be reissued after they expire. This would have a minor adverse impact to leasable mineral development.
Visual Resources	The requirement that all non-temporary facilities and structures be screened, painted, and designed to blend with the surrounding landscape except where safety indicates otherwise. This decision would have little impact on new wells because mitigation is typically incorporated in the design early in the mineral development process.

Impacts Varying Across Alternatives				
Leasable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open with standard terms and conditions – 1,598,870 acres BLM-administered land	1,142,802 acres BLM-administered land	1,089,481 acres BLM-administered land	1,750,774 acres BLM-administered land	1,997,681 acres BLM-administered land
Open with moderate constraints (CSU) – 956,410 acres BLM-administered land	799,649 acres BLM-administered land	449,759 acres BLM-administered land	786,381 acres BLM-administered land	631,634 acres BLM-administered land
Open with major constraints (NSO) – 54,602 acres BLM-administered land	80,394 acres BLM-administered land	162,013 acres BLM-administered land	158,401 acres BLM-administered land	70,142 acres BLM-administered land
Closed – 174,391 acres BLM-administered land	761,404 acres BLM-administered land	1,082,972 acres BLM-administered land	88,502 acres BLM-administered land	84,687 acres BLM-administered land

Summary of Impacts to Leasable Mineral Resources				
Air Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Under the No Action Alternative, 5,874 additional wells are predicted, which will impact air quality from direct and indirect emissions sources. The number of predicted wells is 97% of the number of wells predicted for Alternative D (maximum # wells among the alternatives), so No Action Alternative emissions would be similar in magnitude but potentially less than Alternative D. Because there are many factors that affect air quality impacts, it is uncertain which alternative would have the greatest impact. However, because the number of predicted wells for No Action Alternative, Alternative C, and Alternative D are similar in magnitude, it is anticipated that their air quality impacts would also be similar.	The number of predicted wells is 4,465, which is 74% of the wells predicted under Alternative D. Alternative A has the second lowest number of predicted wells added among alternatives and therefore, is expected to have the second lowest emissions among the alternatives. While there are many factors that affect air quality impacts, air quality impacts are expected to be similar if the number of wells is similar in magnitude.	Alternative B would likely have the lowest air emissions from leasable mineral resources with 3,538 additional wells on BLM lands predicted. This is 59% of the wells predicted under Alternative D. Because there are many factors that affect air quality impacts, it is uncertain which alternative would have the greatest impact. Based on a comparison of the number of wells, Alternative B may have the least air quality impacts among the alternatives.	The number of predicted wells is 5,832, which is 96% of the wells predicted under Alternative D. While there are many factors that affect air quality impacts, air quality impacts are expected to be similar if the number of wells is similar in magnitude, therefore, the air quality impacts are expected to be similar to Alternative D.	Alternative D would have the greatest number of wells added (6044), with 170 more than No Action Alternative, therefore, this alternative would likely have the greatest emissions resulting from leasable mineral resources. Because there are many factors that affect air quality impacts, it is uncertain which alternative would have the greatest impact. However, because the number of wells under No Action Alternative and Alternative C are similar in magnitude to Alternative D, 97% and 96% of Alternative D, respectively, air quality impacts from these three alternatives are expected to be similar in magnitude.
Land Tenure				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Approximately 218,318 acres would be disposed of through sale, exchange, or some other title transfer. This would have a direct adverse effect on leasable mineral development because disposal would remove these lands from leasing and development, which would result in a loss of production and royalties. The acreage represents 10% of the total BLM-administered lands.	18,703 acres in the planning area would be eligible for disposal through sale or exchange or other title transfer. This action would remove these lands from leasing and development. This would be 1% of the total BLM-administered surface lands.	26,125 acres would be disposed and removed from mineral leasing. This would be 1% of the total BLM-administered surface lands.	32,123 acres would be disposed and removed from mineral leasing. This would be 2% of the total BLM-administered surface lands in the planning area.	51,579 acres would be disposed and removed from mineral leasing. This would be 3% of the total BLM-administered surface lands in the planning area.

Summary of Impacts to Leasable Mineral Resources				
Land Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Under the No Action Alternative, 30,965 acres would be managed as ROW avoidance areas, and 7,056 areas would be managed as ROW exclusions areas within the planning area,	629,149 acres would be designated as a ROW avoidance zone, and 662,038 acres as a ROW exclusion zone.	413,654 acres would be designated as a ROW avoidance zone, and 918,701 acres as a ROW exclusion zone.	313,619 acres would be designated as a ROW avoidance zone, and 165,378 acres as a ROW exclusion zone.	270,360 acres would be designated as a ROW avoidance zone, and 69,540 acres as a ROW exclusion zone.
Recreation – Leasable Mineral Allocations within Proposed SRMAs and ERMAs				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open with standard terms and conditions – 11,477	1,533 acres	4,596 acres	1,544 acres	1,533 acres
Open with moderate constraints (CSU) – 48,540	39,851 acres	45,791 acres	49,769 acres	45,529 acres
Open with major constraints (NSO) – 6,008	9,483 acres	19,389 acres	14,219 acres	11,863 acres
Closed – 13,534 acres	2,099 acres	6,776 acres	1,275 acres	204 acres
Special Designations – Leasable Mineral Allocations within Proposed Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open with standard terms and conditions – 1,438 acres of ACECs	71,191 acres of ACECs	61,907 acres of ACECs	33,947 acres of ACECs	–
Open with moderate constraints (CSU) – 0 acres of ACECs	1,389 acres of ACECs	4,732 acres of ACECs	19,932 acres of ACECs	–
Open with major constraints (NSO) – 4,735 acres of ACECs	22,870 acres of ACECs	98,534 acres of ACECs	16,562 acres of ACECs	9,766 acres of ACECs
Closed – 7,262 acres of ACECs	399,592 acres of ACECs	396,260 acres of ACECs	28,120 acres of ACECs	19,127 acres of ACECs

Summary of Impacts to Leasable Mineral Resources				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
38,753 acres of BLM surface and 5,887 acres of split estate would be managed as VRM Class II, which accounts only 2% of BLM-administered surface lands and 1% of split estate in the planning area. Thus, the decision would at most impact 149 wells.	229,172 acres of BLM surface and 31,534 acres of split estate would be managed as VRM Class II, which would be 11% of BLM-administered surface lands and 4% of split estate in the planning area. This would constrain operations and cause some operations to be relocated. This decision could affect as many as 744 new wells, one exploration permit or license, and one solid mineral lease during the next 20 years, although some of the areas with VRM Class II requirements would be closed to leasable mineral leasing under this alternative.	283,096 acres of BLM surface and 44,621 acres of split estate would be managed as VRM Class II, which would represent 14% of BLM-administered surface lands and 6% of split estate in the planning area. This would constrain operations and cause some operations to be relocated.	108,984 acres of BLM surface and 11,941 acres of split estate would be managed as Class II. This would be 5% of the total BLM surface lands and 2% of split estate planning area. Most of the VRM Class II area would be outside the areas known to have potential for leasable minerals.	70,424 acres of BLM surface and 10,702 acres of split estate would be managed as VRM Class II, which would be 3% of BLM-administered surface lands and 1% of split estate in the planning area.

2.51 SUMMARY OF IMPACTS TO LOCATABLE MINERAL RESOURCES

Summary of Impacts to Locatable Mineral Resources	
Management Actions with No Impacts or Minor Impacts	
Air Resources	Requirements under all alternatives for mufflers to control noise, diesel engine emission standards (EPA Tier 4 non-road Diesel Engine Emission Standards or equivalent) to control fossil fuel emissions, and daily watering of construction areas to control fugitive dust would increase the operations constraints placed locatable mineral operations but not substantially.
Backcountry Byways	When backcountry byways are designated in the future, they may encroach on existing or planned locatable mineral operations. Associated mitigation measures would increase the constraints placed on the operations. The conditions would most likely not preclude locatable mineral development.
Cultural Resources	Conflicts between locatable mineral development and cultural resources would be resolved in accordance with regulations, policy, and the Permian Basin Programmatic Agreement between the SHPO and the BLM, including consultation with tribes concerning mineral development. Some policies may cause minor delays in locatable mineral development, but the delays would not reduce the land available for location or the number of locatable mineral operations.
Cave and Karst	There are no cave and karst management decisions considered in Chapter 2 that would impact locatable minerals.
Land Authorizations	Utility corridors and communication sites can be in direct conflict with locatable mineral operations. However, only one locatable mineral operation is projected for the planning period, so the likelihood of conflict is unlikely. Minor ROWs typically have no impact on locatable mineral operations. Major ROWs for wind and solar power generation can be segregated from location and entry under the mining laws if conflicts are anticipated.
Leasable Minerals	None of the leasable decisions would have any impact on the availability of land for location and entry or the number of locatable mineral operations.
Livestock Grazing	The standards for rangeland health apply to reclamation of all locatable minerals operations in the planning area; however, these standards would not significantly increase the constraints placed on locatable mineral operations or impact lands available for location and entry.
Paleontological Resources	None of the paleontological resources decisions would impact the amount of land available for location and entry under the mining laws or the number of locatable mineral operations.
Public Health and Safety	Locatable mineral operations already are required to follow all safety regulations and policies, including OSHA and MSHA rules. Management actions to enforce rules have no impact on locatable mineral development.
Renewable Energy	Locations of both wind and solar projects could overlap with locatable mineral deposits; however, solar and wind energy project lands can be segregated from location and entry under the mining laws.
Riparian Resources	There are no riparian management decisions considered in Chapter 2 that would impact locatable minerals.
Salable Mineral Resources	The only impacts of salable mineral development on locatable mineral development would be a conflict from the location of existing and projected mines. Only one locatable mine exists in the planning area, and only one is projected for the planning period. Thus, the likelihood of a location conflict is remote.

Summary of Impacts to Locatable Mineral Resources	
Soil Resources	There are no soil resources management decisions considered in Chapter 2 that would impact locatable minerals.
Special Status Species	There are no special status species management decisions considered in Chapter 2 that would impact locatable minerals.
Travel Management	Travel management decisions can limit cross-country travel and restrict travel to established routes. These decisions have an adverse impact on locatable mineral exploration and development because these restrictions would increase the constraints placed on exploration operations.
Vegetation, including Noxious Weeds	None of the decisions under alternatives for this RMP change or impact the availability of land for mining claim location and entry under the mining laws or the numbers of locatable mineral operations.
Water Resources	There are no water resources management decisions considered in Chapter 2 that would impact locatable minerals.
Wildland Fire Management	There are no wildland fire management decisions considered in Chapter 2 that would impact locatable minerals.
Wildlife and Fish	There are no wildlife and fish management decisions considered in Chapter 2 that would impact locatable minerals.
Impacts from Management Common to All	
Locatable Minerals	Under all alternatives, the BLM would encourage and facilitate the development of public land mineral resources by private industry so that national and local needs are met. Environmentally sound exploration, extraction, and reclamation practices would be used. This management decision would have a beneficial effect on locatable mineral development because it would allow for market driven exploration and development and a reasonable regulatory framework for locatable mineral operations.
Land Tenure	Disposal of lands would have a direct adverse impact on locatable mineral development because the lands would no longer be available for sales or permits. If mineral rights are retained, disposal would have no impact on the availability of land for mineral entry and, thus, no impact on locatable mineral development.
Lands Managed to Protect Wilderness Characteristics	Under all action alternatives, lands managed to protect wilderness characteristics would be withdrawn from location and entry under the mining laws. This decision would have a direct adverse impact on the lands available for location and entry.
Recreation	No impacts to locatable minerals would occur from recreation management decisions common to all alternatives.
Special Designations	Under all alternatives, WSAs would remain open to location and entry under the mining laws but would be managed in accordance with the IMP under the non-impairment standard. Mitigation imposed on mining operations in WSAs would increase the constraints placed on operations. However, no active mining claims exist in the WSAs nor are any locatable mineral operations projected.
Visual Resources	No impacts to locatable minerals would occur from visual resource management decisions common to all alternatives.

Summary of Impacts to Locatable Mineral Resources				
Impacts Varying Across Alternatives				
Locatable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open to mineral entry – 2,751,856 acres BLM-administered land	2,403,114 acres BLM-administered land	2,110,098 acres BLM-administered land	2,651,855 acres BLM-administered land	2,661,705 acres BLM-administered land
Recommended (or previously recommended) for withdrawal – 32,374 acres BLM-administered land	380,990 acres BLM-administered land	673,996 acres BLM-administered land	132,249 acres BLM-administered land	122,444 acres BLM-administered land
Land Tenure				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Disposal of about 218,318 acres of public land would have a direct adverse impact on mineral development because the lands would no longer be available for sales or permits.	18,703 acres in the planning area would be disposed through sale or exchange or other title transfer and would no longer be available for sales or permits.	26,125 acres would be disposed through sale or exchange or other title transfer and would no longer be available for sales or permits.	31,123 acres would be disposed through sale or exchange or other title transfer and would no longer be available for sales or permits.	51,579 acres would be disposed through sale or exchange or other title transfer and would no longer be available for sales or permits.
Lands Managed to Protect Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No lands would be managed as land with wilderness characteristics. No impacts to locatable minerals would occur.	2% of the total BLM-administered lands withdrawn from mineral entry to manage lands with wilderness characteristics.	2% of the total BLM-administered lands withdrawn from mineral entry to manage lands with wilderness characteristics.	0.2% of the total BLM-administered lands withdrawn from mineral entry to manage lands with wilderness characteristics.	0.04% of the total BLM-administered lands withdrawn from mineral entry to manage lands with wilderness characteristics.
Recreation – Areas withdrawn from locatable mineral entry for proposed SRMAs and ERMAs				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Withdrawn – 14,282 acres	12,786 acres	23,583 acres	13,351 acres	12,066 acres
Special Designations –Areas withdrawn from locatable mineral entry within special designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Withdrawn – 13,434 acres of ACECs	96,781 acres of ACECs	154,915 acres of ACECs	43,878 acres of ACECs	26,470 acres of ACECs

Summary of Impacts to Locatable Mineral Resources				
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Areas managed as VRM Class I and II would adversely impact locatable mineral development. This combined acreage is 50,671 acres of BLM-administered land.	Areas managed as VRM Class I and II would adversely impact locatable mineral development. This combined acreage is 273,710 acres of BLM-administered land.	Areas managed as VRM Class I and II would adversely impact locatable mineral development. This combined acreage is 357,802 acres of BLM-administered land.	Areas managed as VRM Class I and II would adversely impact locatable mineral development. This combined acreage is 67,962 acres of BLM-administered land.	Areas managed as VRM Class I and II would adversely impact locatable mineral development. This combined acreage is 48,263 acres of BLM-administered land.

2.52 SUMMARY OF IMPACTS TO SALABLE MINERAL RESOURCES

Summary of Impacts to Salable Mineral Resources	
Management Actions with No Impacts or Minor Impacts	
Air Resources	Requirements under all alternatives for mufflers to control noise, diesel engine emission standards (EPA Tier 4 non-road Diesel Engine Emission Standards or equivalent) to control fossil fuel emissions, and daily watering of construction areas to control fugitive dust would increase the constraints placed on salable mineral operations. Most likely, no operations would be curtailed because of the air quality requirements.
Backcountry Byways	When Backcountry byways are designated in the future, they may overlap with existing or planned salable mineral operations. Associated mitigation measures would increase the constraints placed on mineral operations.
Cave and Karst	There are no cave and karst resources management decisions that would impact salable minerals.
Cultural Resources	Conflicts between salable mineral development and cultural resources would be resolved in accordance with regulations, policy, and the Permian Basin Programmatic Agreement between the SHPO and the BLM, including consultation with tribes concerning mineral development. Some policies may cause minor delay in salable mineral development, but the delays would be minor and would not reduce the land available for location or the number of salable mineral operations.
Leasable Minerals	The locations of wells or existing solid leasable mineral operations may conflict with the location of salable mineral deposits. Overall, leasable mineral development would not result in the loss or reduction of land acreage available for salable mineral development although it may be fragmented.
Livestock Grazing	The standards for rangeland health would apply to reclamation of all salable minerals operations in the planning area; however, these standards would not significantly increase the constraints placed on salable mineral operations or impact lands available for contracts or permits.
Locatable Minerals	The only impacts of locatable mineral development on salable mineral development would be the conflict from existing and projected mines. Only one locatable mine exists in the planning area, and no additional mines are projected during the planning period. Ample salable mineral resources occur elsewhere in the vicinity of the one producing mine, so a conflict with location is unlikely.

Summary of Impacts to Salable Mineral Resources	
Paleontological Resources	There are no paleontological resources management decisions that would impact salable minerals.
Public Health and Safety	Salable mineral operations already are required to follow all safety regulations and policies, including OSHA and MSHA rules. Management actions to enforce rules have no impact on salable mineral development.
Renewable Energy	Locations of both wind and solar projects could conflict with salable mineral deposits; however, ample supplies of salable minerals occur throughout the planning area.
Riparian	There are no riparian management decisions that would impact salable minerals.
Soil Resources	There are no soil resources management decisions that would impact salable minerals.
Special Status Species	There are no special status species management decisions that would impact salable minerals.
Travel Management	Travel management decisions can impact salable mineral development because access roads for exploration and development can be closed or their use limited temporarily. These actions can impact access to mineral deposits or limit the type of vehicular traffic, which can constrain salable mineral operations. However, typically haulage routes would coincide with existing roadways, and access roads and haul roads would be authorized under the contract or permit.
Vegetation, Including Noxious Weeds	There are no vegetation management decisions that would impact salable minerals.
Water Resources	There are no water resources management decisions that would impact salable minerals.
Wildland Fire Management	There are no wildland fire management decisions that would impact salable minerals.
Wildlife and Fish	There are no wildlife and fish management decisions that would impact salable minerals.
Impacts from Management Common to All	
Salable Minerals	Under all alternatives, surface disturbance would be minimized by only permitting new pits outside a 3-mile perimeter of existing pits, which would have a direct adverse impact on salable mineral development because it would result in a reduction of the number of salable mineral operations.
Land Tenure	Disposal of lands reduces the amount of land available for salable mineral development. If mineral rights are retained, disposal would have no impact on the availability of land for development and, thus, no impact on salable mineral development.
Land Use Authorizations	Exclusions and avoidance decisions would have an indirect adverse impact on mineral development depending on how much acreage within the planning area is impacted.
Lands Managed to Protect Wilderness Characteristics	There would be no impacts to salable mineral development from management common to all alternatives for lands with wilderness characteristics.
Recreation	There would be no impacts to salable mineral development from recreation management common to all alternatives.
Special Designations	WSAs would be closed to salable mineral operations. The total combined acreage under each alternative of the WSAs would be 7,086, which would represent only 0.3% of BLM-administered lands available to salable mineral development.
Visual Resources	There would be no impacts to salable mineral development from visual resources management common to all alternatives.

Summary of Impacts to Salable Mineral Resources				
Impacts Varying Across Alternatives				
Salable Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open – 2,637,465 acres BLM-administered land	1,160,064 acres BLM-administered land	1,121,118 acres BLM-administered land	1,784,431 acres BLM-administered land	2,028,324 acres BLM-administered land
Open with special terms and conditions – 0 acre	1,062,192 acres BLM-administered land	726,270 acres BLM-administered land	752,286 acres BLM-administered land	602,621 acres BLM-administered land
Closed – 146,568 acres BLM-administered land	561,995 acres BLM-administered land	936,799 acres BLM-administered land	247,323 acres BLM-administered land	153,174 acres BLM-administered land
Land Tenure				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
218,318 acres of public land would have a direct adverse impact on salable mineral development because the lands would no longer be available for sales or permits.	18,703 acres of land would have a direct adverse impact on salable mineral development because land disposal would contribute to a reduction in available materials from federal lands if mineral estate were disposed.	Disposal of 26,125 acres would represent 1% of total BLM-administered lands.	Disposal of 31,123 acres would represent 2% of total BLM-administered lands.	Disposal of 51,579 acres would represent 2% of total BLM-administered lands.

Summary of Impacts to Salable Mineral Resources				
Land Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
185 miles of utility corridors about 1 mile wide would impact 184,201 acres, which would be 7% of BLM-administered lands available for salable mineral development. Salable mineral operations in these corridors would be avoided or highly constrained, which would increase the costs of operations. 30,965 acres would be designated as a ROW avoidance zone and 7,056 acres as a ROW exclusion zone. Combined, this would be approximately 1% of the total BLM-administered land	629,149 acres would be designated as a ROW avoidance zone and 662,038 acres as a ROW exclusion zone. Combined, this would be approximately 46% of the total BLM-administered land.	413,654 acres would be designated as a ROW avoidance zone and 918,701 acres as a ROW exclusion zone. Combined, this would be approximately 48% of the total BLM-administered land.	313,619 acres would be designated as a ROW avoidance zone and 165,378 acres as a ROW exclusion zone. Combined, this would be approximately 17% of the total BLM-administered land.	270,360 acres would be designated as a ROW avoidance zone and 69,540 acres as a ROW exclusion zone. Combined, this would be approximately 12% of the total BLM-administered land.
Lands Managed to Protect Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No lands would be managed as land with wilderness characteristics. No impacts to salable minerals would occur.	66,569 acres closed to salable mineral development.	47,607 acres closed to salable mineral development.	9,484 acres closed to salable mineral development.	9,570 acres closed to salable mineral development.
Recreation – Salable Mineral Allocations for Proposed SRMAs and ERMAs				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open with standard terms and conditions – 55,965 acres	9 acres	39 acres	17 acres	7 acres
Open with special terms and conditions – 0 acre	36,878 acres	36,878 acres	36,882 acres	36,882 acres
Closed – 13,504 acres	13,103 acres	13,073 acres	12,772 acres	12,781 acres

Summary of Impacts to Salable Mineral Resources				
Special Designations – Salable Mineral Allocations for Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open with standard terms and conditions – 822 acres of ACECs	71,286 acres of ACECs	64,536 acres of ACECs	33,973 acres of ACECs	0 acre of ACECs
Open with special terms and conditions – 0 acres of ACECs	226,119 acres of ACECs	198,518 acres of ACECs	19,766 acres of ACECs	2,424 acres of ACECs
Closed – 12,613 acres of ACECs	197,644 acres of ACECs	298,343 acres of ACECs	44,824 acres of ACECs	26,468 acres of ACECs
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
43,613 acres of BLM-administered land would be managed as VRM Class II, which accounts for approximately 2% of BLM-administered land in the planning area.	235,946 acres of BLM-administered land would be managed as VRM Class II, which would be approximately 8% of BLM-administered land in the planning area. This would constrain operations and cause some operations to be relocated.	315,700 acres of BLM-administered land would be managed as VRM Class II, which would represent approximately 11% of BLM-administered land in the planning area. This would constrain operations and cause some operations to be relocated.	60,791 acres of BLM-administered land would be managed as Class II. This would be approximately 2% of the total BLM-administered land.	41,092 acres of BLM-administered land would be managed as VRM Class II, which would be approximately 1% of BLM-administered land in the planning area.

2.53 SUMMARY OF RESOURCE CATEGORIES BY ALTERNATIVE THAT RESULT IN EXCLUSION OR AVOIDANCE OF RENEWABLE ENERGY DEVELOPMENT

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Lands with Wilderness Characteristics	No acres specifically excluded for management of lands with wilderness characteristics.	66,666 acres managed for wilderness characteristics as a priority; 64,535 acres excluded for solar and 66,661 acres excluded for wind	47,611 acres managed for wilderness characteristics as a priority, which include wind exclusions and avoidance areas and solar variance or exclusion areas.	5,119 as managed for wilderness characteristics as a priority, which include wind exclusions and avoidance areas and solar variance or exclusion areas.	1,221 managed for wilderness characteristics as a priority, which include wind exclusions and avoidance areas and solar variance or exclusion areas.	
Wilderness Study Areas	7,086 acres excluded	7,086 acres excluded	7,086 acres excluded	7,086 acres excluded	7,086 acres excluded	Excluded by law or regulation
Designated Wild and Scenic Rivers	No acres Specifically excluded	11.9 miles Excluded	11.9 miles Excluded	11.9 miles Excluded	11.9 miles Excluded	Plan amendments for New Mexico should consider whether a buffer zone is appropriate and, if so, how wide it should be, or what site-specific criteria might be applied to determine variable widths. Geothermal PEIS places a 0.25-mile buffer.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Back Country Byways	30 miles excluded	30 miles excluded	30 miles excluded	30 miles excluded	30 miles excluded	Programmatic plan amendments for New Mexico should consider whether a buffer zone is appropriate and, if so, how wide it should be, or what site-specific criteria might be applied to determine variable widths. Consideration should also be made as to whether exceptions may be made for linear projects that may cross trails.
ACECs	12,613 acres excluded for solar and 9,216 acres excluded for wind. 3,397 acres avoided for wind.	12,570 acres closed for geothermal. 410,776 acres excluded for solar and 410,680 acres excluded for wind. 69,178 variance for solar.	13,489 acres closed for geothermal. 481,895 acres excluded for solar and 481,251 acres excluded for wind. 64,953 variance for solar. 1,633 acres avoided for wind.	3,168 acres closed for geothermal. 63,997 acres excluded for solar and 46,572 excluded for wind. 29,627 variance for solar. 14,563 avoided for wind.	1,356 acres closed for geothermal. 27,224 excluded for solar and wind.	Most ACECs have management objectives and/or prescriptions that would exclude renewable energy development. However, those with prescriptions that would allow new ROWs on a case-by-case basis or new oil and gas development with Controlled Surface Use suggest that some development may be allowed. Where an NSO prescription is applied, present interpretations may allow geothermal leasing under the ACEC, with the resource accessed by directional drilling.
VRM Class I	7,058 acres	37,764 acres	42,102 acres	7,171 acres	7,171 acres	
VRM Class II	43,613 acres	235,946 acres	315,700 acres	60,791 acres	41,092 acres	New developments likely excluded except in rare cases. Consideration should be given to additional buffer to prevent visual impairment from wind projects.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Wetlands and Riparian Areas	7,278 acres excluded	7,278 acres excluded	7,278 acres excluded	7,278 acres excluded	7,278 acres excluded	Leasing of geothermal may be allowed with an NSO Stipulation within designated wetland/riparian areas. Transmission lines may be allowed to cross wetland/riparian areas, depending upon results of case-by-case analysis.
Active Floodplains	No acres excluded	All acres excluded	All acres excluded	All acres excluded	All acres excluded	Geothermal programmatic allows leasing in floodplains but requires NSO Stipulation. Considering the long-term nature of wind and solar projects, exclusion would appear appropriate for power sites, but transmission lines may be allowed to cross, depending on specific situation and location of structures such as poles or towers outside of the floodplain.
100-Year Floodplains	No acres specifically excluded	All acres excluded	All acres excluded	All acres excluded	All acres excluded	Development may be allowed, provided that adequate mitigation measures are developed. Transmission lines may be allowed to cross, depending on specific situation and location of structures such as poles or towers outside the floodplain.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Aplomado falcon	4,626 acres of habitat would be variance for solar and 215,944 acres would be excluded. 139,666 acres of habitat would be avoidance area for wind.	121,998 acres of habitat would be closed for geothermal. 12,363 acres of habitat would be variance for solar and 208,202 acres would be excluded. 22 acres of habitat would be avoidance area for wind, and 219,084 acres would be excluded.	121,957 acres of habitat would be closed for geothermal. 12,363 acres of habitat would be variance for solar and 208,202 acres would be excluded. 22 acres of habitat would be avoidance area for wind, and 219,084 acres would be excluded.	67,547 acres of habitat would be closed for geothermal. 16,348 acres of habitat would be variance for solar and 204,113 acres would be excluded. 219,004 acres of habitat would be avoidance area for wind.	67,373 acres of habitat would be closed for geothermal. 16,445 acres of habitat would be variance for solar and 204,019 acres would be excluded. 203,724 acres of habitat would be avoidance area for wind.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with USFWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Dune sagebrush lizard	584 acres of habitat would be variance for solar and 161,486 acres would be excluded. 13,172 acres of habitat would be avoidance area for wind.	7,029 acres of habitat would be closed for geothermal. 125,787 acres of habitat would be variance for solar and 36,277 acres would be excluded. 128,699 acres of habitat would be avoidance area for wind, and 33,328 acres would be excluded.	34,001 acres of habitat would be closed for geothermal. 122,653 acres of habitat would be variance for solar and 39,409 acres would be excluded. 48,284 acres of habitat would be avoidance area for wind, and 112,907 acres would be excluded.	7,029 acres of habitat would be closed for geothermal. 125,188 acres of habitat would be variance for solar and 36,869 acres would be excluded. 128,138 acres of habitat would be avoidance area for wind and 33,920 acres would be excluded.	7,029 acres of habitat would be closed for geothermal. 125,188 acres of habitat would be variance for solar and 36,876 acres would be excluded. 161,271 acres of habitat would be avoidance area for wind and 793 acres would be excluded.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Lesser prairie chicken (LPC)	1,400 acres of isolated population area (IPA) would be closed for geothermal.	56,710 acres of occupied range would be closed for geothermal. 2 acres of IPA would be closed for geothermal. 64,829 acres of habitat with timing restrictions would be excluded for geothermal.	81,529 acres of occupied range would be closed for geothermal. 57,162 acres of IPA would be closed for geothermal. 118,583 acres of habitat with timing restrictions would be closed for geothermal.	56,710 acres of occupied range would be closed for geothermal. 2 acres of IPA would be closed for geothermal. 64,829 acres of habitat with timing restrictions would be closed for geothermal.	56,710 acres of occupied range would be closed for geothermal. 1 acre of IPA would be closed for geothermal. 64,827 acres of habitat with timing restrictions would be closed for geothermal.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.
LPC (continued)	1,023 acres of occupied range would be variance for solar and 204,146 acres would be excluded. 53,760 acres of IPA would be variance for solar and 469,086 acres would be excluded. 276,994 acres of habitat with timing restrictions would be excluded for solar.	150,719 acres of occupied range would be variance for solar and 54,428 acres would be excluded. 509,381 acres of IPA would be variance for solar and 13,258 acres would be excluded. 69,986 acres of habitat with timing restrictions would be excluded for solar.	139,962 acres of occupied range would be variance for solar and 65,180 acres would be excluded. 485,316 acres of IPA would be variance for solar and 37,318 acres would be excluded. 79,559 acres of habitat with timing restrictions would be excluded for solar.	150,088 acres of occupied range would be variance for solar and 55,053 acres would be excluded. 507,535 acres of IPA would be variance for solar and 15,098 acres would be excluded. 70,610 acres of habitat with timing restrictions would be excluded for solar.	150,088 acres of occupied range would be variance for solar and 55,059 acres would be excluded. 507,534 acres of IPA would be variance for solar and 15,105 acres would be excluded. 70,614 acres of habitat with timing restrictions would be excluded for solar.	

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
LPC (continued)	4,361 acres of occupied range would be avoidance area for wind. 23,073 acres of IPA would be avoidance area for wind. 9,536 acres of habitat with timing restrictions would be avoidance area for wind.	151,427 acres of occupied range would be avoidance area for wind and 52,385 acres would be excluded. 516,350 acres of IPA would be avoidance area for wind, and 6,774 acres would be excluded. 206,250 acres of habitat with timing restrictions would be avoidance area for wind and 70,337 acres would be excluded.	20,280 acres of occupied range would be avoidance area for wind and 183,542 acres would be excluded. 298,171 acres of IPA would be avoidance area and 224,901 acres would be excluded. 821 acres of habitat with timing restrictions would be avoidance area for wind and 278,148 acres would be excluded.	150,810 acres would be avoidance area for wind and 53,009 acres would be excluded. 349,300 acres of IPA would be avoidance area for wind and 6,548 acres would be excluded. 206,006 acres of habitat with timing restrictions would be avoidance area for wind and 70,961 acres would be excluded.	197,381 acres of occupied range would be avoidance area for wind and 6,447 acres would be excluded. 349,305 acres of IPA would be avoidance area for wind and 6,548 acres would be excluded. 272,217 acres of habitat with timing restrictions would be avoidance area for wind and 4,758 acres would be excluded.	

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Gypsum wild buckwheat	175 acres of habitat would be excluded for solar. 175 acres of habitat would be avoidance area for wind.	38 acres of habitat would be variance for solar and 136 acres would be excluded. 136 acres of habitat would be excluded for wind.	12 acres of habitat would be variance for solar and 163 acres would be excluded. 163 acres of habitat would be excluded for wind.	12 acres of habitat would be variance for solar and 163 acres would be excluded. 125 acres of habitat would be avoidance area for wind and 38 acres would be excluded.	137 acres of habitat would be variance for solar and 38 acres would be excluded. 38 acres of habitat would be excluded for wind.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with USFWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Kuenzler's hedgehog cactus	46 acres of habitat would be variance for solar and 53,865 acres would be excluded. 49,399 acres of habitat would be avoidance area for wind and 2,985 acres would be excluded.	2,884 acres of habitat would be closed for geothermal. 22,930 acres of habitat would be variance for solar and 30,980 acres would be excluded. 1,198 acres of habitat would be avoidance area for wind and 31,579 acres would be excluded.	2,869 acres of habitat would be closed for geothermal. 22,930 acres of habitat would be variance for solar and 30,980 acres would be excluded. 1,198 acres of habitat would be avoidance area for wind and 31,587 acres would be excluded.	1,226 acres of habitat would be closed for geothermal. 22,994 acres of habitat would be variance for solar and 30,910 acres would be excluded. 11,054 acres of habitat would be avoidance area for wind and 21,652 acres would be excluded.	547 acres of habitat would be closed for geothermal. 39,928 acres of habitat would be variance for solar and 13,979 acres would be excluded. 27,284 acres of habitat would be avoidance area for wind and 3,672 acres would be excluded.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Summary of Resource Categories by Alternative that Result in Exclusion or Avoidance of Renewable Energy Development						
Land Designation	**Alternatives**					**Comments**
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C Preferred**	**Alternative D**	
Lee's pincushion cactus	127 acres of habitat would be excluded for solar. 127 acres of habitat would be avoidance area for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.
SRMAs and ERMAs	13 acres closed to geothermal. 68,358 acres excluded for solar and 7,887 acres excluded for wind. 60,471 acres avoided for wind.	13 acres closed to geothermal. 49,539 excluded for solar and 14,552 acres excluded for wind. 2,633 acres variance for solar. 36,892 acres avoided for wind.	117 acres closed for geothermal. 67,048 acres excluded for solar and 26,089 acres excluded for wind. 8,714 acres variance for solar. 44,846 acres avoided for wind.	117 acres closed for geothermal. 61,556 acres excluded for solar and 18,289 acres excluded for wind. 4,629 acres variance for solar. 44,840 acres avoided for wind.	79 acres closed for geothermal. 55,466 acres excluded for solar and 12,691 acres excluded for wind. 2,872 acres variance for solar. 44,903 acres avoided for wind.	
Highly Erodible Soils	Renewable energy excluded on 245,854 acres with slopes greater than 10%	Renewable energy excluded on 245,854 acres with slopes greater than 10%	Renewable energy excluded on 245,854 acres with slopes greater than 10%	Renewable energy excluded on 245,854 acres with slopes greater than 10%	Renewable energy excluded on 245,854 acres with slopes greater than 10%	

2.54 SUMMARY OF IMPACTS TO LIVESTOCK GRAZING

Summary of Impacts to Livestock Grazing	
Impacts from Management Common to All	
Livestock Grazing Actions	There are no proposed decisions common to all alternatives that would impact livestock grazing.
Minerals Actions	There are no proposed decisions common to all alternatives that would impact livestock grazing.
Special Designations Actions	There are no proposed management decisions that would impact livestock grazing.
Riparian and Wetland Actions	There are no proposed decisions that would impact livestock grazing.
Recreation Actions	SRMAs, ERMAs and RMZs open to grazing would vary; adverse and beneficial impacts would also vary depending on acreages open or closed to livestock grazing.
Wildlife/Special Status Species Actions	Long-term, direct adverse impacts as a result of 200-acre bluntnose shiner critical habitat area closed to livestock grazing.
Upland Vegetation, Wildland Fire and Noxious Weed Management Actions	There are no proposed decisions common to all alternatives that would impact livestock grazing.
Land Use Authorizations Actions	Impacts would vary and be contingent upon site-specific analyses, granting or refusal of ROW development projects and terms and conditions of ROW grants across the planning area.
Lands with Wilderness Characteristics Actions	There are no proposed management decisions that would impact livestock grazing.
Renewable Energy Actions	There are no proposed management decisions that would impact livestock grazing.
Impacts from Management Common to All Action Alternatives	
Livestock Grazing Actions	There are no proposed decisions common to all action alternatives that would impact livestock grazing.
Minerals Actions	There are no proposed decisions common to all action alternatives that would impact livestock grazing.
Special Designation Actions	There are no proposed decisions that would impact livestock grazing.
Riparian and Wetland Actions	There are no proposed decisions that would impact livestock grazing.
Recreation Actions	There are no proposed decisions that would impact livestock grazing.
Wildlife/Special Status Species Actions	Potential for direct adverse impacts if sensitive species' habitats are closed to livestock grazing.
Upland Vegetation, Wildland Fire and Noxious Weed Management Actions	Proposed management actions would not impact livestock grazing.
Land Use Authorizations Actions	Impacts would vary, depending on the project, its location and forage availability.
Lands with Wilderness Characteristics Actions	Direct beneficial impacts from management prescriptions that would contribute to greater forage availability.

Summary of Impacts to Livestock Grazing				
Renewable Energy Actions	Potential beneficial impacts as energy development would be excluded in some areas, thereby contributing to greater forage availability.			
Impacts Varying Across Alternatives				
Livestock Grazing Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long-term benefits from 2,086,107 acres open to grazing and 372,519 available AUMs.	Long-term benefits from 1,598,198 acres open to grazing and 280,965 available AUMs.	Long-term benefits from 1,937,725 acres open to grazing and 340,656 available AUMs.	Long-term benefits from 2,083,232 acres open to grazing and 366,229 available AUMs.	Long-term benefits from 2,087,759 acres open to grazing and 367,024 available AUMs.
Minerals Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
11,778 acres of predicted surface disturbance would impart adverse impacts to livestock grazing, as this acreage would be unavailable for livestock.	8,547 acres of predicted surface disturbance would impart adverse impacts to livestock grazing, as this acreage would be unavailable for livestock.	8,262 acres of predicted surface disturbance would impart adverse impacts to livestock grazing, as this acreage would be unavailable for livestock.	11,175 acres of predicted surface disturbance would impart adverse impacts to livestock grazing, as this acreage would be unavailable for livestock.	12,129 acres of predicted surface disturbance would impart adverse impacts to livestock grazing, as this acreage would be unavailable for livestock.
Special Designations Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No acres would be closed to grazing across ACECs.	Adverse impacts to livestock grazing as 449,747 acres would be closed to grazing across ACECs.	Adverse impacts to livestock grazing as 135,480 acres would be closed to grazing across ACECs.	Adverse impacts to livestock grazing as 5,735 acres would be closed to grazing across ACECs.	Adverse impacts to livestock grazing as 201 acres would be closed to grazing across ACECs.
Recreation Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long-term adverse impacts as a result of 1,398 acres within designated SRMAs and ERMAs closed to livestock grazing.	Long-term adverse impacts as a result of 10,376 acres within designated SRMAs and ERMAs closed to livestock grazing.	Long-term adverse impacts as a result of 18,473 acres within designated SRMAs and ERMAs closed to livestock grazing.	Long-term adverse impacts as a result of 1,803 acres within designated SRMAs and ERMAs closed to livestock grazing.	Long-term adverse impacts as a result of 1,581 acres within designated SRMAs and ERMAs closed to livestock grazing.

Summary of Impacts to Livestock Grazing				
Land Use Authorization Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
184,201 acres would remain designated for major utility and facility alignments; adverse impacts to livestock grazing would occur as ROW applications are granted and available forage decreases. 30,965 acres designated as avoidance and 7,056 acres as exclusion areas would impart direct beneficial impacts, as these area would lend to greater forage availability.	629,149 acres designated as avoidance and 662,038 acres designated as exclusion would impart direct beneficial impacts, as these area would lend to greater forage availability.	413,654 acres designated as avoidance and 918,701 acres designated as exclusion would impart direct beneficial impacts, as these area would lend to greater forage availability.	313,619 acres designated as avoidance and 165,378 acres designated as exclusion would impart direct beneficial impacts, as these area would lend to greater forage availability.	270,360 acres designated as avoidance and 69,540 acres designated as exclusion would impart direct beneficial impacts, as these area would lend to greater forage availability.
Lands with Wilderness Characteristics Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impact as no acres would be closed to livestock grazing within LWC units.	Adverse impacts as a result of 47,488 acres within LWC units closed to grazing.	Adverse impacts as a result of 19,026 acres within LWC units closed to grazing.	Same as the No Action Alternative.	Same as the No Action Alternative.
Renewable Energy Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Energy Development restrictions on over 1 million acres would impart beneficial impacts through greater forage availability.	Energy Development restrictions on 768,020 acres would impart beneficial impacts through greater forage availability.	Energy Development restrictions on 833,305 acres would impart beneficial impacts through greater forage availability.	Energy Development restrictions on approximately 734,636 acres would impart beneficial impacts through greater forage availability.	Energy Development restrictions on approximately 630,302 acres would impart beneficial impacts through greater forage availability.

2.55 SUMMARY OF IMPACTS TO TRAVEL MANAGEMENT

Summary of Impacts to Travel Management	
Impacts from Management Common to All	
Air Resources	Short term, adverse impacts to travel from road surfacing to reduce fugitive dust. Adverse impacts would result from travel delays or rerouting around affected roads during treatments.
Wildland Fire Management	Short term, adverse impacts to travel accessibility if prescribed burns or wildland fires crossed travel routes. Road closures or rerouting would affect travel opportunities in order to protect public safety.
Land Tenure	Long term, beneficial impacts from land exchanges, purchases of private and state lands. Exchanges and purchases would potentially increase travel accessibility within formerly private or state-owned lands within the planning area.
Land Use Authorizations	Long term, beneficial impacts to travel accessibility because management actions would make reasonable efforts to provide travel access to private and public lands if planning area resources were not significantly impacted.
Minerals	Short term and long term, beneficial impacts to travel accessibility from granting ROWs, and construction of leasable, saleable, and locatable minerals sites access roads that would allow travel access.
Noxious Weeds and Vegetation	Same Impacts as Wildland Fire Management because herbicide and pesticide treatments, mechanical treatments, and controlled fire treatments would require temporary route closures or rerouting to protect public health and safety.
Recreation and Special Designations	These impacts to travel are discussed in the Recreation Summary of Impacts.
Renewable Energy	Long term adverse impacts to travel from restricting accessibility to sites developed for solar and wind energy collection.
Impacts from Management Common to All Action Alternatives	
Travel Management	Long term beneficial impacts from adaptive management of travel at the activity planning level. Travel-related resource and use conflicts would be identified and resolved through potential modification of Limited and Closed route designations.
Land Tenure	Long term beneficial impacts from acquiring lands through exchanges, purchases, and donations if they provide access to public lands that would increase accessibility on lands formerly held in private ownership.
Lands with Wilderness Characteristics	Long term adverse impacts to travel accessibility and OHV opportunities from route closure or OHV limited travel within designated LWC areas.

Summary of Impacts to Travel Management				
Impacts Varying Across Alternatives				
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Adverse impacts on 2.7% Closed to OHV use; Beneficial impacts on 97.3% Open or Limited to OHV access.	Adverse impacts on 2.5% Closed to OHV use; Beneficial impacts on 97.5% Limited to OHV use.	Adverse impacts on 2.0% Closed to OHV use; Beneficial impacts on 98% OHV Limited Routes.	Adverse impacts on 1.9% Closed to OHV use; Beneficial impacts on 98.1% OHV Limited Routes.	Same as Alternative C.
Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long term, beneficial impacts from potential OHV accessibility on Leasable (92%), Salable (95%), and Locatable (99%) of planning area.	Long term, beneficial impacts to OHV accessibility on Leasable (70%), Salable (80%), and Locatable (86%) of planning area.	Long term, beneficial impacts to OHV accessibility on Leasable (57%), Salable (66%), and Locatable (76%) of planning area.	Long term, beneficial impacts to OHV accessibility on Leasable (91%), Salable (91%), and Locatable (95%) of planning area.	Long term, beneficial impacts to OHV accessibility on Leasable (94%), Salable (95%), and Locatable (96%) of planning area.
Lands with Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No impacts to travel because no areas designated as LWCs. OHV Limited travel accessibility would continue to be available in these areas.	66,666 acres managed to protect LWCs, with long term adverse impacts from closed designations and OHV Limited travel within these areas.	47,611 acres managed to protect LWCs, same as Alternative A.	5,119 acres managed to protect LWCs.	1,212 acres managed to protect LWCs.
Riparian				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long term, adverse impacts from closing OHV travel accessibility to seeps and springs.	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Wildlife and Fish				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No impacts to travel in Birds of Prey ACEC because area would continue to be available for travel opportunities.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.

2.56 SUMMARY OF IMPACTS TO RECREATION

Summary of Impacts to Recreation	
Impacts from Management Common to All	
Recreation Actions	Long-term, beneficial recreation area management plans (RAMPs) would be developed for all SRMAs.
Air Quality Actions	All projects would be required to meet air quality standards to beneficially protect long distance scenic views.
Backcountry Byway Actions	The Guadalupe Backcountry Byway would be beneficially managed for on-road recreation.
Cave and Karst Actions	Cave resources would be intensely managed and protected, benefiting specialized recreation.
Wildland Fire Actions	Prescribed fire conducted throughout the planning area would beneficially reduce risks to recreation users and infrastructure and create habitat for wildlife viewing.
Health and Safety Actions	Maintenance of strategies for floodplains, hazardous materials, and air quality to beneficially protect recreating public health and safety throughout the planning area.
Minerals Actions	Drilling mitigation applied to beneficially avoid impacts to cave/karst resources and to protect scenic quality in the Dark Canyon area.
Livestock Grazing Actions	Range improvements that would affect special status species habitat would be prohibited, which would benefit wildlife viewing. Planning area acreage would be managed as open or closed. Closed areas would benefit recreation by reducing surface disturbances and impacts to scenic quality, benefitting non-mechanized users.
Noxious Weeds Actions	No impacts to recreation from herbicide and mechanical treatments to control weeds.
Renewable Energy Actions	No impact on recreation at programmatic level of energy development.
Riparian Actions	No impact on recreation from surveys to assess riparian area health.
Soils Actions	Reclamation of disturbed sites in sensitive areas would be beneficial to recreation by improving scenic quality in the long term.
WSR Actions	If Congress legislates that a river or river segment not be designated as part of the NWSRS, then protection beneficial to recreational use would be removed and subject to other resource management actions.
WSA Actions	The four existing WSAs would continue to be managed for protection until released by Congress, which would be beneficial for non-mechanized users, but adverse for mechanized and some specialized recreation users.
Special Status Species Actions	Negligible impacts to recreation resources and users because consultation with state and federal agencies, protection of endangered species would not restrict or enhance recreation at the RMP programmatic level.
Travel Actions	Seasonal limits on OHV use near active heronries would be adverse for OHV recreational travel by limiting opportunities. Limiting OHV cross-country use (where not otherwise permitted) to lessee or permittee site inspections would have negligible impacts on recreation because the intent would not be recreational.
Vegetation Actions	Short-term, adverse impacts to recreation caused by vegetation treatments that restrict travel, create surface disturbances, and reduce scenic quality. Long-term beneficial impacts from enhanced wildlife habitat and wildlife viewing,

Summary of Impacts to Recreation	
Visual Actions	No impacts to recreation from managing leased areas to accommodate transmission line infrastructure. Long-term, beneficial impacts from designating VRM Class I and II areas; long-term, adverse impacts from designating VRM Class III and IV areas.
Wildlife and Fish	Long-term, beneficial impacts to recreation from actions that maintain and improve wildlife and fish habitat, which would increase fishing opportunities and wildlife viewing opportunities.
Impacts from Management Common to All Action Alternatives	
Recreation	The Cave Resources SRMA would not be designated, but recreational caves would be managed under the Caves ACEC. Red Bluff Reservoir boat ramp would be maintained. Hackberry Lake and Alkali Lake would be the preferred OHV play area locations. Hackberry Lake, Guadalupe Byway, and Cottonwood Day use area would be the main areas emphasizing planning area interpretation. Black River, Hackberry Lake, Conoco Lake, and La Cueva Trails would be designated as SRMAs. Rock climbing would be constrained when it conflicts with cultural resources or natural resources, and prohibited in protected rock art areas.
Air Quality	Oil and gas drilling and production projects would be required to meet diesel emission standards; vent socks on bulk concrete transfers to beneficially reduce fugitive dust and protect scenic quality.
Land Tenure Actions	CFO would acquire easements across non-public lands to beneficially provide access for recreational needs.
Lands with Wilderness Characteristics	OHV Limited and closed use, managed as VRM Class I and II, prohibited firewood gathering, closed to minerals leasing and disposal would create a range of recreational opportunities that benefit all user groups. Preservation of characteristics would adversely impact specialized users (climbers).
Noxious Weeds	No impacts to recreation from treatment of weeds.
Renewable Energy	Beneficial impacts to recreation from development of energy in previously disturbed or planned areas of disturbance for preservation of scenic quality.
ACECs	Creation of four ACECs would range from no impact (Bluntnose Shiner ACEC not managed for recreation) to beneficial for recreation from resource preservation and/or preservation of recreational opportunities (Cave, Lonesome Ridge, and Serpentine Bends ACECs).
RNAs	No impacts to recreation because these special designation areas are not managed for recreational use and would not be designated in the revised RMP.
SMAs	No impacts to recreation because these special designation areas would not be designated in the revised RMP, but would continue to be managed for recreation resource protection but without designation status.
Wildlife and Fish	Long-term, beneficial impacts from habitat corridor development, development of habitat management plans, reintroduction of fish species, seasonal restrictions in sensitive nesting areas. Short-term, adverse impacts to OHV users and primitive campers from seasonal restrictions in sensitive nesting areas.

Summary of Impacts to Recreation				
Impacts Varying Across Alternatives				
Recreation				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Alkali Lake – No SRMA designation. Beneficial impacts to OHV users because focus would be on OHV use, with effectively open use within play areas.	SRMA designation. Long term, beneficial impacts to OHV users from effectively open use within play areas.	Same as Alternative A.	ERMA designation. Long term, beneficial impacts to OHV users in play areas	No designation as SRMA or ERMA. Short-term beneficial impacts for OHV use, but long-term adverse impacts from lack of recreation management, overcrowding, use conflicts, and lack of recreation infrastructure.
Black River – SRMA designation. Beneficial impacts to non-mechanized and water users because focus would be on these users.	Designation as SRMA. Impacts same as No Action Alternative, except additional beneficial impacts from VRM II preservation of scenic quality outside of Cottonwood Use Day Area.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Cave Resources – SRMA designation. Beneficial impacts from scenic preservation under VRM I and II, but adverse from grazing.	No SRMA or ERMA, but managed under Cave Resources ACEC.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Conoco Lake – No SRMA designation. Long term, adverse impacts to emphasized focus on boating and non-mechanized users from OHV use, VRM Class IV objectives, and resource use conflicts.	Designation as SRMA. Beneficial impacts to targeted users (boating, non-mechanized) from reduced conflicts. long term adverse impacts from OHV prohibitions.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.

Summary of Impacts to Recreation				
Hackberry Lake – Designation as SRMA. Long term, beneficial impacts to emphasized OHV users; adverse impacts to non-mechanized users, and from resource use conflicts.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.
La Cueva – No SRMA designation. Long term, adverse impacts to all users from no SRMA management, and uncontrolled public dumping.	SRMA designation. Beneficial impacts on emphasized non-motorized recreation from planning and elimination of dumping; adverse impacts to all users from degraded scenic quality under VRM III objectives.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Pecos River Corridor – SRMA designation. Long term beneficial impacts on mechanized and non-mechanized users from reduced user conflicts and scenic quality preservation under VRM II.	Same as No Action Alternative, except improved scenic quality preservation by managing all of the area under VRM II would be beneficial for all users.	ERMA designation. Less beneficial to all users than No Action Alternative because of the reduced recreation management under ERMA designation (reduced infrastructure, no specific management and planning for emphasized user groups).	Same as Alternative B.	No SRMA or ERMA designation. Lack of management would create conditions for recreation resource user conflicts and lack of infrastructure planning would not meet user needs.
West Wells Dune – No SRMA or ERMA designation. Beneficial impacts to emphasized OHV users from reduced user conflicts; adverse impacts from long term overcrowding and lack of infrastructure.	No SRMA or ERMA designation. Long term adverse impacts to all users from resource use conflicts and safety concerns. Long term beneficial impacts to OHV users from unrestricted use within dunes play areas.	ERMA designation. Impacts same as A, except ERMA management would provide infrastructure for users as needed	Same as Alternative B.	Same as Alternative B.

Summary of Impacts to Recreation				
Pecos River Equestrian – No SRMA or ERMA designation. Long term adverse impacts to mechanized and non-mechanized users from user conflicts, and from lack of recreation management.	ERMA designation. Focus on non-mechanized and non-motorized users would be beneficial to these groups; beneficial impacts to all users from RAMP preparation for this ERMA. Adverse impacts to OHV users from reduced recreational opportunities.	ERMA designation. Same as Alternative A.	Same as Alternative A.	ERMA designation. Impacts same as Alternative B.
Hay Hollow Equestrian – No SRMA or ERMA designation. Same impacts as above for Pecos River Equestrian.	ERMA designation. Long term adverse impacts to mechanized and non-mechanized users from resource use conflicts; adverse impacts on wildlife viewing.	ERMA designation. Focus on equestrian and non-motorized users. Long term adverse impacts to motorized OHV users from reduction in opportunities; beneficial impacts to non-motorized and non-mechanized users.	Same as No Action Alternative.	Same as No Action Alternative.
Square Lake – No SRMA or ERMA designation. Long term adverse impacts to all users from scenic quality degradation. Adverse impacts for users from resource use conflicts and lack of infrastructure. Beneficial impacts for motorized OHV users.	ERMA designation. Long term beneficial impacts for OHV users from reduced user conflicts and infrastructure development through ERMA targeted management for this user group.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Air Quality				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts to all users from long-distance scenic views maintained by requiring that projects meet air quality standards.	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative.	Same as No Action Alternative

Summary of Impacts to Recreation				
Backcountry Byways				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Guadalupe Byway managed under VRM Class II to maintain scenic quality, and managed to enhance visitor use and safety would be beneficial to recreational on-road scenic drivers.	Same as No Action Alternative	Same as No Action Alternative.	Same as No Action Alternative	Guadalupe Byway managed to enhance visitor use and safety would be beneficial to recreational on-road scenic drivers. Guadalupe Byway managed under VRM Class III would be adverse by permitting scenic quality degradation.
Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial, surface protection impacts to recreation from Closed and NSO oil and gas leasing on 228,993 acres; 32,374 acres withdrawn or recommended for withdrawal from locatable development, and 146,568 closed to saleable development.	Beneficial, surface protection impacts to recreation from Closed and NSO oil and gas leasing on 841,798 acres; 380,990 acres withdrawn or recommended for withdrawal from locatable development, and 561,995 closed to saleable development.	Beneficial, surface protection impacts to recreation from Closed and NSO oil and gas leasing on 1,244,985 acres; 673,996 acres withdrawn or recommended for withdrawal from locatable development, and 936,799 closed to saleable development.	Beneficial, surface protection impacts to recreation from Closed and NSO oil and gas leasing on 246,903 acres; 132,249 acres withdrawn or recommended or withdrawal from locatable development, and 247,323 closed to saleable development.	Beneficial, surface protection impacts to recreation from Closed and NSO oil and gas leasing on 154,829 acres; 122,444 acres withdrawn from locatable, and 153,174 closed to saleable development.
Livestock Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts to all users from livestock exclusion on 1,939 acres closed to grazing.	Beneficial impacts to all users from livestock exclusion on 493,120 acres closed to grazing.	Beneficial impacts to all users from livestock exclusion on 153,583 acres closed to grazing.	Beneficial impacts to all users from livestock exclusion on 8,115 acres closed to grazing.	Beneficial impacts to all users from livestock exclusion on 3,594 acres closed to grazing.
Lands with Wilderness Characteristics				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No beneficial impacts to recreation from no areas designated for wilderness characteristics protection.	Beneficial impacts to recreation from designation of 66,666 acres for wilderness characteristics protection.	Beneficial impacts to recreation from designation of 47,611 acres for wilderness characteristics protection.	Beneficial impacts to recreation from designation of 35,715 acres for wilderness characteristics protection.	Beneficial impacts to recreation from designation of 4,348 acres for wilderness characteristics protection.

Summary of Impacts to Recreation				
Renewable Energy				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Direct, beneficial impacts to recreation from restriction of renewable energy projects in ACECs, Byway, Carlsbad NP viewshed, Guadalupe Escarpment, and Cave/Karst areas.	Direct, beneficial impacts to recreation from restriction of renewable energy projects in SRMAs, ERMAs, cave/karst areas, Carlsbad NP viewshed.	Same impacts as A, except wind projects would be avoided (not excluded) for ERMAs.	Same as Alternative B.	Same as Alternative B.
Riparian				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Long term, adverse impacts for OHV and non-mechanized users from prohibitions on surface disturbances in riparian areas. Beneficial impacts for wildlife viewers.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Beneficial impacts from unspecified OHV and camping use in riparian areas. Long term, adverse impacts to wildlife viewers and resources from surface disturbances and resource use conflicts with OHV users.
Special Designations (ACECs)				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Blue Springs Riparian- No impacts to recreation because the area is managed for species protection under private ownership.	Impacts same as the No Action Alternative.	Impacts same as the No Action Alternative.	Impacts same as the No Action Alternative.	Impacts same as the No Action Alternative.
Birds of Prey Grasslands – Beneficial to OHV users; adverse to non-mechanized users from resource use conflicts.	Beneficial protection to scenery under VRM I and II (17%), but long-term adverse impacts from OHV and non-mechanized user conflicts.	Same as Alternative A.	No ACEC designation. VRM II management would be beneficial for resources. Management under VRM Class III and IV would degrade scenic quality and have adverse impacts on all resource users and on wildlife viewing recreation.	Same as No Action Alternative.

Summary of Impacts to Recreation				
Boot Hill – No impacts to recreation because the area is not managed for recreation, but managed for cultural resource protection.	No ACC designation. Same as No Action Alternative.	Same as No Action Alternative.	No designation. Same as No Action Alternative.	No designation. Same as No Action Alternative.
Cave Resources – Beneficial impacts to specialized users and OHV users from cave protection and OHV limited travel; adverse impacts to non-mechanized users from user conflicts.	Beneficial impacts to specialized and non-mechanized users from scenic quality protection, Adverse impacts from OHV and non-mechanized user conflicts.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Chihuahuan Desert Rivers – No ACEC designation. Adverse impacts from low scenic quality protection. Beneficial impacts to OHV users; adverse impacts to other users from resource use conflicts.	Designated ACEC, but same as No Action Alternative.	Same as A, except more beneficial from more area protected under VRM Class II for scenic quality protection.	No Designation. Similar to Alternative A.	No Designation. Similar to Alternative A.
Chosa Draw – Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.
Dark Canyon Scenic Area - Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.	Same as Cave Resources ACEC impacts above.
Desert Heronries – Adverse impacts from low scenic quality protection. Beneficial impacts to OHV users because area provides OHV limited travel; no impacts to other user groups.	No ACEC designation. Same as No Action Alternative.	Same as Alternative A.	ACEC designation. Same as No Action Alternative.	Same as Alternative A.

Summary of Impacts to Recreation				
Gypsum Soils – No ACEC designation. Beneficial impacts to OHV users from unlimited travel; adverse impacts to non-mechanized users from resource use conflicts. Adverse impacts to scenic quality from low protection.	No ACEC designation. Beneficial impacts to OHV users from travel opportunities; adverse impacts to non-mechanized users from resource use conflicts; adverse impacts to scenic quality from low protection.	ACEC designation. Similar to A, except increased beneficial impacts for all users from increased scenic quality preservation under VRM Class II.	ACEC designation. Similar to A.	Same as C.
Laguna Plata – No ACEC designation. No impacts to recreation because the area is managed to protect cultural resources, not for recreational use.	ACEC designation. Same as No Action Alternative.	ACEC designation. Same as the No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.
Lonesome Ridge – Beneficial for non-mechanized users because of scenic quality preservation; adverse for OHV users from limited travel opportunities.	Same as No Action Alternative, except the entire area would be closed to OHV use and adverse for OHV users.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Maroon Cliffs – Beneficial impacts to OHV users from continuing access to routes; negligible impacts to other rec users because the area is managed to preserve cultural resources, not managed for rec use.	Same as No Action Alternative.	Same as No Action Alternative, except additional beneficial impacts from scenic quality preservation under VRM Class II.	Same as Alternative A.	Same as Alternative A.
Pecos Blunt Nose Shiner Habitat – No impacts to recreation because the area is managed for species protection, not rec use.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.	Same as the No Action Alternative.

Summary of Impacts to Recreation				
Pecos River/Canyons Complex – Beneficial impacts to OHV users from access to ACEC and scenic quality preservation under VRM II. Adverse impacts to non-mechanized user from resource use conflicts.	Beneficial impacts to OHV users from ACEC access and from scenic quality protection under VRM II. Adverse impacts to non-mechanized users from resource use conflicts	Same as Alternative A.	Same as A, except less area managed under VRM II.	No ACEC designation. Impacts same as Alternative A.
Pope's Well – Beneficial impacts to on-road sightseeing users; no impacts to other users because the site is not managed for other rec uses.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.
Salt Playas – Beneficial impacts for OHV users from range of travel opportunities; adverse impact to non-mechanized user from lack of rec. opportunities.	No ACEC designation. Same impacts as No Action Alternative.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Serpentine Bends – No ACEC designation. Beneficial impacts for OHV users from range of travel opportunities; beneficial impacts from scenic protection under VRM I and II, but adverse impacts to non-mechanized users from resource use conflicts.	ACEC designation. Same as No Action Alternative, except more scenic protection under VRM I.	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
Seven Rivers Hills – No impacts to non-mechanized recreation because the area is managed for plant species protection, not recreational use. Beneficial impacts to OHV users from travel access.	No ACEC designation. Same impacts as No Action Alternative.	Same as No Action Alternative, except beneficial impacts from increased scenic protection.	Same as Alternative B.	Same as B, except that scenic quality would be adversely impacted by management under VRM Class III and IV.

Summary of Impacts to Recreation				
Six Shooter – No ACEC designation. Beneficial impacts from scenic protection under VRM II. Beneficial impacts to OHV users from travel opportunities; adverse impacts to non-mechanized users from resource use conflicts.	ACEC designation. Same impacts as No Action Alternative.	Same as Alternative A.	Same as No Action Alternative.	Same as No Action Alternative.
Special Designations (WSRs)				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts to river-related OHV and non-mechanized recreation from current management actions to protect the Delaware and Black River segments under the NWSRS eligibility status during RMP process.	Beneficial protection impacts to OHV and non-mechanized river-related users from recommendation of Delaware and Black rivers as Scenic under the NWSRS.	Beneficial protection impacts to OHV and non-mechanized users from recommendation of Black River as Scenic under the NWSRS, but adverse impacts to river-related users from no recommendation for the Delaware River.	Same as Alternative B.	Same as Alternative B.
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial impacts to OHV limited users from travel opportunities on 97.3% of planning area.	Same impacts as No Action Alternative, except more beneficial from OHV limited access on 97.5% of planning area.	Same impacts as No Action Alternative, except more beneficial from OHV limited access on 98.0% of planning area.	Same impacts as No Action Alternative, except more beneficial from OHV limited access on 98.1% of planning area.	Same as Alternative C.
Visual Resources				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Beneficial scenic-protection impacts for all users from designation of 50,671 acres as VRM Class I and II.	Beneficial scenic-protection impacts for all users from designation of 273,710 acres as VRM Class I and II.	Beneficial scenic-protection impacts for all users from designation of 357,802 acres as VRM Class I and II.	Beneficial scenic-protection impacts for all users from designation of 67,962 acres as VRM Class I and II.	Beneficial scenic-protection impacts to all users from designation of 48,263 acres as VRM Class I and II.

Summary of Impacts to Recreation				
Wildlife and Fish				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Impacts to Birds of Prey grasslands and Bluntnose Shiner ACECs Discussed under ACECs.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.	Same as No Action Alternative.

2.57 SUMMARY OF IMPACTS TO LAND USE AUTHORIZATIONS

Summary of Impacts to Land Use Authorizations	
Impacts from Management Common to All	
Land Use Authorizations	Issuances of land use authorizations would be subject to site-specific environmental review, and special conditions may be placed on authorizations in cases of environmental conflict. A total of 578 miles (20,990 acres) of specific ROW corridors would be designated under all alternatives.
Minerals Allocations on Split Estate Lands	Surface development on split estate lands designated as open to leasable, salable, and locatable minerals development under varying levels of terms and conditions would be subject approval by the surface estate owner and could limit the nature of land use authorizations issued by the BLM in those areas.
Recreation	The Trails RMZ portion of the Dunes RMZ would be managed as a combination of excluded to ROWs (in dunes) and avoidance of ROWs (on trails). This designation would limit the ability to issue land use authorizations in this area.
Riparian	Approximately 7,278 acres of riparian areas would be identified as avoidance or exclusion areas for ROWs. This would limit the ability to issue land use authorizations in these areas.
Special Designations	Approximately 7,086 acres of WSAs would be managed as exclusion areas for future rights-of-way. This would limit the ability to issue land use authorizations in these areas.
Visual Resource Management	Areas designated VRM Class I would be managed as ROW exclusion areas. No ROW authorizations could be made in these areas.
Impacts from Management Common to All Action Alternatives	
Cave & Karst Resources	See Special Designations
Land Use Authorizations	All lands in the planning area except those specifically designated as exclusion, avoidance, or withdrawal areas would be open to consideration for land use authorizations, including ROWs, pending site-specific and project-specific analysis. This would provide flexibility to the land use program in issuing land use authorizations.
Lands with Wilderness Characteristics	All lands with wilderness characteristics would be designated as ROW exclusion areas, thereby limiting the issuance of land use authorizations in these areas.

Summary of Impacts to Land Use Authorizations				
Special Designations	The Black River SRMA (1,275 acres) would be managed as a right-of-way exclusion area. The Hackberry Lake SRMA (38,942 acres) would be managed as an avoidance area for ROWs. These decisions would limit the ability to issue land use authorizations in these two SRMAs. Blue Springs Riparian Habitat ACEC (160 acres) and Bluntnose Shiner Habitat ACEC (201 acres) would be managed as an avoidance areas for future rights-of-way while the Lonesome Ridge ACEC (3,021 acres), the Laguna Plata ACEC (4,496 acres), the Cave Resources ACEC (18, 832 acres), the Maroon Cliffs ACEC (8,659 acres), the Pope's Well ACEC (81 acres), and the Serpentine Bends ACEC (4,216 acres) would be managed to exclude future ROWs. Additionally, the Black River WSR would be managed as an exclusion area for ROWs and the Delaware River WSR would be managed as either an avoidance or exclusion area for ROWS depending on the action alternative in question. These decisions would limit the ability of the BLM to issue land use authorizations in these areas.			
Impacts Varying Across Alternatives				
Lands with Wilderness Characteristics: Acres of Exclusion, Avoidance, and Withdrawal of Rights-of-way				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
2,904	66,661	66,560	5,119	1,212
Recreation Areas: Acres of Exclusion, Avoidance, and Withdrawal of Rights-of-way				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
6,694	51,433	70,923	65,419	49,573
Renewable Energy: Acres of Exclusion, Avoidance, and Withdrawal of Rights-of-way and Authorizations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
2,733,339	2,057,788	2,162,616	1,822,129	1,628,379
Special Designations – ACECs: Acres of Exclusion, Avoidance, and Withdrawal of Rights-of-way				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
6,691	411,275	483,426	61,165	27,225
Special Status Species Areas: Acres of Exclusion, Avoidance, and Withdrawal of Rights-of-way				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
18,649	1,416,938	1,416,929	361,330	333,835
Visual Resources – VRM I: Acres of Exclusion, Avoidance, and Withdrawal of Rights-of-way				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
7,058	37,764	42,102	7,171	7,171

2.58 SUMMARY OF IMPACTS TO LAND TENURE

Summary of Impacts to Land Tenure	
Impacts from Management Common to All	
Cultural Resources	Inventories or assessments for cultural resources would be required prior to approval of land disposals. Areas of cultural resource concern would not be prioritized for disposal. Protection of cultural resources would be prioritized in considerations of land acquisition and land exchange. This would limit the ability to enact land exchanges, particularly in areas of high cultural resource sensitivity.
Land Tenure	Public lands not specifically identified for disposal would be retained in BLM ownership and managed for multiple use. All lands considered for disposal would meet criteria in sections 203, 206, or 209 of the FLPMA. This means that the vast majority of land in the planning area would be identified for retention pending future requests from outside parties. BLM lands adjacent to Carlsbad Caverns National Park would be made available for exchange to accommodate the NPS objective to acquire a private inholding within the National Park lands administered by the NPS; parties involved in the exchange would include the BLM, the NPS, and the private inholder. This decision would authorize consideration of a land tenure adjustment. Land disposal would avoid springs and seeps by 328 feet unless the water source has been closed. BLM would prioritize lands for sale, exchange, or title transfer based on whether said lands are needed for a federal project or resource management activity, are important to the national interest, or are not cost efficient for the BLM to manage. Existing R&PP authorizations would be terminated and converted to other land tenure adjustment methods (e.g., sale) if the criteria for disposal are met.
Paleontological Resources	Inventories or assessments for paleontological resources would be required prior to approval of land disposals. Areas of paleontological resource concern would not be prioritized for disposal. Protection of paleontological resources would be prioritized in considerations of land acquisition and land exchange. This would limit the ability to enact land exchanges, particularly in areas of high paleontological resource sensitivity.
Special Designations	All WSAs (7,086 acres) would be specifically retained in federal ownership, making these lands unavailable for disposal or exchange.

Summary of Impacts to Land Tenure					
Impacts from Management Common to All Action Alternatives					
Land Tenure	All springs and seeps would be closed or withdrawn from mineral disposal and locatable minerals use allocations. Land tenure adjustments would not be made for disposal of these lands for the purposes of mineral resource uses. If FLTFA is reauthorized, lands available for disposal would have to meet the FLTFA criteria for disposal. Acquisition priorities (not in priority order) would include: • Endangered, Threatened, Proposed, or Candidate species habitat; • BLM Type 2 Sensitive species habitat; • Lands within special designations; • Riparian areas; • Lands containing known archaeological, paleontological, or historical values determined to be unique or of traditional or scientific importance; • Lands that would provide public access to public lands, including but not limited to, river access and areas of high recreation value; • Lands that would help consolidate public land; • Lands that would help improve livestock grazing management. Variances for disposal of land in areas identified for retention could be authorized to facilitate state exchanges if doing so would consolidate blocks of public land, consistent with multiple use objectives, and there is a compelling need.				
Lands with Wilderness Characteristics	All lands with wilderness characteristics would be specifically designated for retention in federal ownership.				
Impacts Varying Across Alternatives					
Land Tenure Adjustments: Acres Designated for Disposal					
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	
218,318	18,703	26,125	31,536	51,579	
Land Tenure Adjustments: Acres Designated for Retention					
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**	
1,872,747	2,070,580	2,063,155	2,057,744	2,037,362	

2.59 SUMMARY OF IMPACTS TO SPECIAL DESIGNATIONS

Summary of Impacts to Special Designations				
Impacts Varying Across Alternatives				
Impacts of Special Designation Actions				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
6 ACECs 13,435 acres	9 ACECs 495,042 acres	15 ACECs 561,441 acres	8 ACECs 98,563 acres	5 ACECs 28,894 acres
4 WSAs 7,086 acres	4 WSAs 7,086 acres	4 WSAs 7,086 acres	4 WSAs 7,086 acres	4 WSAs 7,086 acres
None	2 WSR segments suitable	1 WSR segment suitable	1 WSR segment suitable	1 WSR segment suitable
2 Backcountry Byways	1 Backcountry Byway	1 Backcountry Byway	2 Backcountry Byways	2 Backcountry Byways

Summary of Impacts to Special Designations				
Impacts from Minerals				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
ACECs Surface disturbance associated with mineral development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Approximately 54% of areas would be closed to leasable minerals and 100% of areas would be closed to locatable minerals. Approximately 94% of areas would be closed to salable minerals. **WSRs** The Black River WSR corridor segment and Delaware River segment would be open with major constraints for leasables, closed to salables, and recommended for withdrawal for locatable mineral development. **WSAs** WSAs would either be closed or open with major constraints to mineral development.	**ACECs** Surface disturbance associated with mineral development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. For Alternative A, approximately 14% of proposed ACECs would be open for leasable and salable mineral development with standard terms and conditions and approximately 80% of areas would be open for locatable mineral development. Approximately 81% would be closed to leasable minerals and between 20% and 40% closed to salable and locatable minerals. **WSRs** Mineral development would be closed in both the Black and Delaware WSR corridors. **WSAs** WSAs would either be closed or open with major constraints to mineral development.	**ACECs** Surface disturbance associated with mineral development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. For Alternative B, approximately 11% of proposed ACECs would be open for leasable and salable mineral development with standard terms and conditions and 72% of areas would be open for locatable mineral development. Approximately 71% would be closed to leasable minerals and between 28% and 53% closed to salable and locatable minerals. **WSRs** Mineral development would be closed on the Black WSR corridor segment and portions of the Delaware WSR segment would be open to mineral development. **WSAs** WSAs would either be closed or open with major constraints to mineral development.	**ACECs** Surface disturbance associated with mineral development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. For Alternative C, approximately 34% of proposed ACECs would be open for leasable mineral development with standard terms and conditions. About 34% of areas would be open to salable minerals and 55% of areas would be open for locatable mineral development. Approximately 29% would be closed to leasable minerals and approximately 45% would be closed to salable and locatable minerals. **WSRs** Mineral development would be closed on the Black WSR corridor segment and portions of the Delaware WSR segment would be open to mineral development. **WSAs** WSAs would either be closed or open with major constraints to mineral development.	**ACECs** Surface disturbance associated with mineral development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. For Alternative D, 0% of proposed ACECs would be open for leasable mineral development with standard terms and conditions. Approximately 34% would be open with major constraints. About 8% of areas would be open to locatable mineral development. Approximately 66% would be closed to leasable minerals and approximately 92% would be closed to salable and locatable minerals. **WSRs** Mineral development would be closed on the Black WSR corridor segment and portions of the Delaware WSR segment would be open to mineral development. **WSAs** WSAs would either be closed or open with major constraints to mineral development.

Summary of Impacts to Special Designations				
Impacts from Renewable Energy				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Surface disturbance associated with renewable energy development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be either avoided or excluded from renewable energy development. Approximately 12,613 acres (94%) would be excluded from solar energy development. Wind energy development would be avoided on 3,397 acres (25%), and closed on 9,216 acres (69%). The Black and Delaware WSR segments would be closed or excluded from renewable energy development. WSAs would be excluded from renewable energy development.	Surface disturbance associated with renewable energy development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be excluded from solar and wind renewable energy development. Approximately 12,570 acres (3%) would be closed to geothermal development, and approximately 410,680 acres (83%) would be closed to wind energy development. approximately 410,776 acres (83%) would be excluded from solar development. The Black and Delaware WSR segments would be excluded from renewable energy development. WSAs would be excluded from renewable energy development.	Surface disturbance associated with renewable energy development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be either avoided or excluded from solar and wind renewable energy development. Approximately 13,489 acres (2%) would be closed to geothermal development, and approximately 481,251 acres (86%) would be closed to wind development. Approximately 481,895 (86%) would be excluded from solar development. The Black and Delaware WSR segments would be excluded from renewable energy development. WSAs would be excluded from renewable energy development.	Surface disturbance associated with renewable energy development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be either avoided or excluded from solar and wind renewable energy development. Approximately 3,168 acres (3%) would be closed to geothermal development, and approximately 46,572 acres (47%) would be closed to wind development. Approximately 63,997 acres (65%) would be excluded from solar development. The Black and Delaware WSR segments would be excluded from renewable energy development. WSAs would be excluded from renewable energy development.	Surface disturbance associated with renewable energy development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be excluded from solar and wind renewable energy development. Approximately 1,356 acres (5%) would be closed to geothermal development, and approximately 27,224 acres (94%) would be closed to wind and solar development. The Black and Delaware WSR segments would be excluded from renewable energy development. WSAs would be excluded from renewable energy development.

Summary of Impacts to Special Designations				
Impacts from ROWs				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Surface disturbance associated with ROW development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Approximately 5,922 acres (44%) would be open to ROW development. Approximately 5,533 acres (41%) would be an avoidance area for ROW development. The Black and Delaware WSR segments would be an avoidance area for ROW development. ROWs would be avoided in WSAs.	Surface disturbance associated with ROW development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be excluded from ROW development. Approximately 411,275 acres (83%) would be excluded from ROW development. Approximately 68,676 acres (14%) would be open to ROW development. The Black and Delaware WSR segments would be excluded from ROW development. WSAs would be excluded from ROW development.	Surface disturbance associated with ROW development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be excluded from ROW development. Approximately 481,248 acres (86%) would be excluded from ROW development and 2,178 acres (<1%) designated as an avoidance area. Approximately 62,823 acres (11%) would be open to ROW development. The Black and Delaware WSR segments would be excluded from ROW development. WSAs would be excluded from ROW development.	Surface disturbance associated with ROW development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be either avoided or excluded from renewable energy development. Approximately 41,810 acres (42%) would be excluded from ROW development and 19,355 acres (20%) designated as a ROW avoidance area. Approximately 32,498 acres (33%)) would be open to ROW development. The Black and Delaware WSR segments would be excluded from renewable energy development. WSAs would be excluded from ROW development.	Surface disturbance associated with ROW development could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most lands in proposed ACECs would be either avoided or excluded from renewable energy development. Approximately 24,246 acres (84%) would be excluded from ROW development and 2,979 acres (10%) designated as an avoidance area. The Black and Delaware WSR segments would be excluded from renewable energy development. ROWs would be avoided in WSAs.

Summary of Impacts to Special Designations				
Impacts from OHV Travel, Fire Suppression, and Geophysical Exploration				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Surface disturbance associated with OHV travel, fire suppression, and geophysical exploration could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Approximately 7,556 acres (56%) would be OHV limited, and 5,052 acres (38%) would be closed to OHV travel, fire suppression, and geophysical exploration. The Black and Delaware WSR segments would be open for OHV travel, fire suppression, and geophysical exploration for 6.3 miles and OHV limited for 2.2 miles. In WSAs, travel, fire suppression, and geophysical exploration would be OHV limited.	Surface disturbance associated with OHV travel, fire suppression, and geophysical exploration could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most travel, fire suppression, and geophysical exploration in proposed ACECs would be OHV limited. Approximately 473,752 acres (96%) would be OHV limited, and 6,208 acres (1%) would be closed to OHV travel, fire suppression, and geophysical exploration. The Black and Delaware WSR segments would be OHV limited. In WSAs, travel, fire suppression, and geophysical exploration would be OHV limited.	Surface disturbance associated with OHV travel, fire suppression, and geophysical exploration could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most travel, fire suppression, and geophysical exploration in proposed ACECs would be OHV limited. Approximately 540,220 acres (96%) would be OHV limited, and 6,647 acres (1%) would be closed to OHV travel, fire suppression, and geophysical exploration. The Black and Delaware WSR segments would be OHV limited. In WSAs, travel, fire suppression, and geophysical exploration would be OHV limited.	Surface disturbance associated with OHV travel, fire suppression, and geophysical exploration could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most travel, fire suppression, and geophysical exploration in proposed ACECs would be OHV limited. Approximately 88,052 acres (89%) would be OHV limited, and 5,589 acres (6%) acres would be closed to OHV travel, fire suppression, and geophysical exploration. The Black and Delaware WSR segments would be OHV limited. In WSAs, travel, fire suppression, and geophysical exploration would be OHV limited.	Surface disturbance associated with OHV travel, fire suppression, and geophysical exploration could adversely affect ACEC relevant and important values, WSR's outstandingly remarkable values, and wilderness character. Most travel, fire suppression, and geophysical exploration in proposed ACECs would be OHV limited. Approximately 22,970 acres (79%) would be OHV limited, and 4,254 acres (15%) would be closed to OHV travel, fire suppression, and geophysical exploration. The Black and Delaware WSR segments would be OHV limited. In WSAs, travel, fire suppression, and geophysical exploration would be OHV limited.

Summary of Impacts to Special Designations				
Impacts from Grazing				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Surface disturbance associated with grazing could adversely affect ACEC relevant and important values. Most lands in proposed ACECs would be open to grazing. Approximately 12,613 acres (94%) would be open to grazing. Grazing would have no effects to the Black and Delaware WSR segments or WSAs.	Surface disturbance associated with grazing could adversely affect ACEC relevant and important values. Most lands in proposed ACECs would be closed to grazing. Approximately 449,747 acres (91%) would be closed to grazing. Approximately 30,195 acres would be open to grazing. Grazing would have no effects to the Black and Delaware WSR segments or WSAs.	Surface disturbance associated with grazing could adversely affect ACEC relevant and important values. Most lands in proposed ACECs would be open to grazing. Approximately 411,384 acres (73%) would be open to grazing. Approximately 135,480 acres would be closed to grazing. Grazing would have no effects to the Black and Delaware WSR segments or WSAs.	Surface disturbance associated with grazing could adversely affect ACEC relevant and important values. Most lands in proposed ACECs would be open to grazing. Approximately 88,543 acres (90%) would be open to grazing. Approximately 5,735 acres would be closed to grazing. Grazing would have no effects to the Black and Delaware WSR segments or WSAs.	Surface disturbance associated with grazing could adversely affect ACEC relevant and important values. Most lands in proposed ACECs would be open to grazing. Approximately 27,023 acres (94%) would be open to grazing. Approximately 201 acres would be closed to grazing. Grazing would have no effects to the Black and Delaware WSR segments or WSAs.

2.60 SUMMARY OF IMPACTS TO HEALTH AND SAFETY

Summary of Impacts to Health and Safety	
Impacts from Management Common to All	
Health and safety actions	Under all alternatives, the CFO would reduce risks of H_2S exposure by carrying forward management related to H2s alarm placement.
Recreation actions	Under all alternatives, the BLM would reduce conflicts between recreationists and oil and gas development and carry forward OHV safety measures.
Mineral development	The impacts from management of hazardous substances would be the same under all alternatives. The potential for impacts may vary by alternative based on the level of mineral-related activities. To reduce adverse impacts to health and safety, authorized users would adhere to hazardous spill response plans, stipulations, and all applicable laws and regulations pertaining to hazardous substances. These requirements would provide detailed strategy and process for responding to releases of hazardous substances, therefore reducing short-term impacts from contamination.
Wildland fire and fuels	Under all alternatives, the BLM would prioritize preservation of life and property in wildfire response actions.

Summary of Impacts to Health and Safety				
Impacts from Management Common to All Action Alternatives				
Health and safety actions	Under all action alternatives, the CFO would utilize new and existing database systems to track H_2S alarm incidents. This information would lead to reducing risk of exposure by mapping and publicizing these data to potential public land users.			
Minerals-Locatable: AML sites	Under all action alternatives, BLM efforts to locate, inventory, and close abandoned mines would reduce risk to the public by posting warning signs at any unstable AML sites, and closing and remediating AML sites when funding is available.			
Impacts Varying across Alternatives				
Travel Management				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
97% OHV limited	98% OHV limited	98% OHV limited	98% OHV limited	98% OHV limited
Mineral Development: Oil and Gas				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
8,636 acres of estimated surface disturbance from oil and gas activity for the 20-year life of the RMP, after reclamation.	6,565 of estimated surface disturbance from oil and gas activity for the 20-year life of the RMP. Reduces potential for release of hazardous materials by allowing less development of oil and gas, than the No Action Alternative.	5,202 acres of estimated surface disturbance from oil and gas activity for the 20-year life of the RMP. Reduces potential for release of hazardous materials by allowing less development of oil and gas than the No Action Alternative.	8,575 acres of estimated surface disturbance from oil and gas activity for the 20-year life of the RMP. Potential for release of hazardous materials is generally the same as the No Action Alternative as the proposed level of development is very similar.	8,887 acres of estimated surface disturbance from oil and gas activity for the 20-year life of the RMP. Increased potential for release of hazardous materials by allowing more development of oil and gas than the No Action Alternative.
Special Designations				
No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
No management to reduce risks of natural hazards by designation of certain ACECs.	Two ACECs would be designated with management to reduce visitor risk from natural hazards in ACECs.	Three ACECs would be designated with management to reduce visitor risk from natural hazards in ACECs.	Same as Alternative B, three ACECs would be designated with management to reduce visitor risk from natural hazards in ACECs.	Two ACECs would be designated with management to reduce visitor risk from natural hazards in ACECs.

2.60.1 Social and Economic Conditions

2.60.1.1 Summary of Economic Effects by Alternative

The following discussion summarizes projected effects on the SESA economy from activities on CFO-managed lands under each of the alternatives. In addition to the projected effects from mineral, grazing, and recreation-related activities described earlier in this section, this summary also notes the regional economic effects from direct BLM employment and expenditures, but does not attempt to project BLM budgets or expenditures in the future (which depend on Federal budget priorities). For purposes of simplicity and presentation, projected economic effects from grazing are based on the midpoint of the ranges of potential effects projected earlier for each alternative. The discussion concludes with a summary of effects on state, local, and federal tax revenues for each alternative.

2.60.1.1.1 Projected Economic Effects from the No Action Alternative

As of 2017, CFO direct expenditures and activities on BLM-managed and split estate lands support almost 13,100 jobs in the SESA and currently generate an estimated $155 million per year in state and local tax revenues, as well as an estimated $204 million per year in federal tax revenues. Under the No Action Alternative, more than 1,600 more jobs would be supported by the tenth year of the planning period and approximately 2,500 more jobs would be supported by the end of the planning period. Most of the employment growth would be due to increases in oil and gas-related activity and additional potash mining. Table 2-51 summarizes projected employment directly and indirectly related to activities on CFO-managed lands, as well as BLM direct employment and expenditures, under the No Action Alternative. BLM employment and expenditures are driven by Federal budget priorities and processes and were not projected over the 20-year planning period.

Table 2-51. Summary of Projected Direct and Indirect Employment Effects under the No Action Alternative

Jobs	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	10,991	11,203	212	424
Other mineral related	3,460	4,152	1,384	2,076
Grazing related	137	137	None	None
Recreation related	104	116	12	24
BLM employment and spending related*	NA	NA	NA	NA
Total jobs	***14,692***	***15,608***	***1,608***	***2,524***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Activities on BLM-managed and split estate lands and direct employment and expenditures by the CFO currently generate an estimated $155 million per year in state and local tax revenues. Under the No Action Alternative, annual state and local tax revenues related to the CFO are projected to grow by approximately $17 million by year 10 of the planning period and by $27 million per year by the end of the planning period. These increases in tax revenues are due to projected increases in oil and gas and potash activity, as summarized in Table 2-52.

Table 2-52. Summary of Projected Direct and Indirect Effects on Annual State and Local Tax Revenues under the No Action Alternative (millions of 2014 dollars)

Revenues	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$134.9	$137.7	$2.9	$5.7
Other mineral related	$36.2	$43.4	$14.5	$21.7
Grazing related	$1.1	$1.1	$0.0	$0.0
Recreation related*	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA
Total revenues	***$172.2***	***$182.2***	***$17.4***	***$27.4***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Activities on BLM-managed lands and direct employment and expenditures by the CFO currently generate an estimated $204 million per year in federal tax revenues. Under the No Action Alternative, annual federal revenues related to the CFO are projected to grow by approximately $27 million by year 10 of the planning period and by $43 million per year by the end of the planning period. These increases in tax revenues are due to projected increases in oil and gas and potash activity, as summarized in Table 2-53.

Table 2-53. Summary of Projected Direct and Indirect Effects on Annual Federal Tax Revenues under the No Action Alternative (millions of 2014 dollars)

Revenues	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$170.4	$172.7	$3.3	$6.7
Other mineral related	$59.9	$71.9	$24.0	$35.9
Grazing related	$1.1	$1.1	$0.0	$0.0
Recreation related*	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA
Total revenues	***$231.4***	***$246.7***	***$27.3***	***$42.6***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Non-market values associated with lands managed by the CFO could not be quantified. However, as discussed earlier, the No Action Alternative is likely the least protective of these values among all of the alternatives and would likely result in the lowest total non-market value associated with CFO-managed lands.

2.60.1.1.2 Projected Economic Effects from Alternative A

Table 2-54 summarizes projected employment directly and indirectly related to activities on CFO-managed lands under Alternative A.

Alternative A is projected to support approximately 935 fewer jobs by year 10 of the planning period than the No Action Alternative and approximately 1,383 fewer jobs by the end of the 20-year planning period. These projected employment effects are primarily due to fewer oil and gas-related jobs, as well as a smaller reduction in grazing-related employment. However, total employment supported by CFO-managed lands under Alternative A during the planning period is still projected to exceed employment levels under existing conditions.

Table 2-54. Summary of Projected Direct and Indirect Employment Effects under Alternative A

Jobs	Projections for Alternative A		Projected Differences between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	10,201	10,028	-578	-750	-790	-1,175
Other mineral related	3,460	4,152	1,384	2,076	0	0
Grazing related	121	121	-16	-16	-16	-16
Recreation related	104	116	12	24	0	0
BLM employment and spending related*	NA	NA	NA	NA	NA	NA
Total jobs	***13,886***	***14,417***	***802***	***1,333***	***-807***	***-1,191***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

State and local tax revenues under Alternative A are projected to be approximately $8 million less than under the No Action Alternative in year 10 of the planning period and approximately $13 million per year less than under the No Action Alternative by the end of the planning period. Tax revenues under Alternative A are, however, projected to be larger than under existing conditions due to projected increases in revenues from future potash mines ("other mineral-related" revenues). These effects are summarized in Table 2-55.

Table 2-55. Summary of Projected Direct and Indirect Effects on Annual State and Local Tax Revenues under Alternative A (millions of 2014 dollars)

Revenues	Projections for Alternative A		Projected Differences between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$126.9	$125.1	-$5.1	-$7.0	-$8.0	-$12.7
Other mineral related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$164.0***	***$169.4***	***$9.2***	***$14.5***	***-$8.2***	***-$12.9***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Under Alternative A, annual federal revenues related to the CFO are projected to be approximately $12 million lower than under the No Action Alternative by year 10 of the planning period and about $18 million per year lower than the No Action Alternative by the end of the planning period. Like state and local tax revenues, however, federal tax revenues under Alternative A are projected to be larger than current revenues (existing conditions). These effects are summarized in Table 2-.

Table 2-56. Summary of Projected Direct and Indirect Effects on Annual Federal Tax Revenues under Alternative A (millions of 2014 dollars)

Revenues	Projections for Alternative A		Projected Differences between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$158.0	$155.9	-$9.0	-11.2	-$12.3	-$17.8
Other mineral related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$218.8***	***$228.7***	***$14.8***	***$24.5***	***-$12.5***	***-$18.0***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative A, along with Alternative B, would do the most to protect and enhance non-market values among all of the alternatives considered in this RMP.

2.60.1.1.3 Projected Economic Effects from Alternative B

Table 2-57 summarizes projected employment directly and indirectly related to activities on CFO-managed lands under Alternative B.

Alternative B is projected to support approximately 1,315 fewer jobs by the tenth year of the planning period than the No Action Alternative and approximately 1,953 fewer jobs by the end of the 20-year planning period. These projected employment effects are primarily due to fewer oil and gas-related jobs, as well as a smaller reduction in grazing-related employment. Overall, Alternative B would support the fewest jobs among all of the alternatives considered in this RMP. However, total employment supported by CFO-managed lands under Alternative B during the planning period is still projected to exceed current employment levels.

Table 2-57. Summary of Projected Direct and Indirect Employment Effects under Alternative B

Jobs	Projections for Alternative B		Projected Differences between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	9,681	9,255	-1,098	-1,523	-1,310	-1,948
Other mineral related	3,460	4,152	1,384	2,076	0	0
Grazing related	132	132	-5	-5	-5	-5
Recreation related	104	116	12	24	0	0
BLM employment and spending related*	NA	NA	NA	NA	NA	NA
Total jobs	***13,377***	***13,655***	***293***	***572***	***-1,315***	***-1,953***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

State and local tax revenues under Alternative B are projected to be approximately $12 million less than under the No Action Alternative in year 10 of the planning period and approximately $21 million per year less than under the No Action Alternative by the end of the planning period. State and local tax revenues are, however, projected to be larger under Alternative B than existing conditions. These effects are summarized in Table 2-58.

Table 2-58. Summary of Projected Direct and Indirect Effects on Annual State and Local Tax Revenues under Alternative B (millions of 2014 dollars)

Revenues	Projections for Alternative B		Projected Differences between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$122.8	$117.1	-$9.2	-$14.9	-$12.1	-$20.6
Other mineral related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$159.9***	***$161.4***	***$5.1***	***$6.6***	***-$12.3***	***-$20.8***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Under Alternative B, annual federal revenues related to the CFO are projected to be approximately $19 million lower than under the No Action Alternative by year 10 of the planning period and about $29 million per year lower than the No Action Alternative by the end of the planning period. Due to projected increases in federal revenues from "other mineral-related activity" (new potash mines), federal revenues are projected to be greater under Alternative B than under existing conditions. These effects are summarized in Table 2-59.

Table 2-59. Summary of Projected Direct and Indirect Effects on Annual Federal Tax Revenues under Alternative B (millions of 2014 dollars)

Revenues	Projections for Alternative B		Projected Differences between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$151.3	$144.6	-$15.8	-$22.5	-$19.1	-$29.1
Other mineral related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$212.1***	***$217.4***	***$8.0***	***$13.2***	***-$19.3***	***-$29.3***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative B, along with Alternative A, would do the most to protect and enhance non-market values among all of the alternatives considered in this RMP.

2.60.1.1.4 Projected Economic Effects under Alternative C

Table 2-60 summarizes projected employment directly and indirectly related to activities on CFO-managed lands under Alternative C.

Alternative C is projected to support approximately 24 fewer jobs by the tenth year of the planning period than the No Action Alternative and approximately 35 fewer jobs by the end of the 20-year planning period. These projected employment effects reflect fewer oil and gas-related jobs. However, total employment related to CFO lands and direct BLM activities under Alternative C would increase over the planning period relative to current conditions and would be more than 1,000 jobs higher than under either Alternative A or B by the end of the planning period.

Table 2-60. Summary of Projected Direct and Indirect Employment Effects under Alternative C

Jobs	Projections for Alternative C		Projected Differences between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	10,968	11,169	189	390	-23	-34
Other mineral related	3,460	4,152	1,384	2,076	0	0
Grazing related	136	136	-1	-1	-1	-1
Recreation related	104	116	12	24	0	0
BLM employment and spending related*	NA	NA	NA	NA	NA	NA
Total jobs	***14,668***	***15,573***	***1,584***	***2,489***	***-24***	***-35***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

State and local tax revenues under Alternative C are projected to be approximately $200,000 less than under the No Action Alternative in year 10 of the planning period and approximately $400,000 per year less than under the No Action Alternative by the end of the planning period. State and local tax revenues are, however, projected to be larger under Alternative C than existing conditions. These effects are summarized in Table 2-61.

Table 2-61. Summary of Projected Direct and Indirect Effects on Annual State and Local Tax Revenues under Alternative C (millions of 2014 dollars)

Revenues	Projections for Alternative C		Projected Differences between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$134.6	$137.4	$2.6	$5.3	-$0.2	-$0.4
Other mineral related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing related	$1.1	$1.1	$0.0	$0.0	$0.0	$0.0
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$171.9***	***$181.9***	***$17.1***	***$27.0***	***-$0.2***	***-$0.4***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Under Alternative C, annual federal revenues related to the CFO are projected to be approximately $400,000 to $500,000 lower than under the No Action Alternative. Federal revenues are projected to be greater under Alternative C than under existing conditions. These effects are summarized in Table 2-62.

Table 2-62. Summary of Projected Direct and Indirect Effects on Annual Federal Tax Revenues under Alternative C (millions of 2014 dollars)

Revenues	Projections for Alternative C		Projected Differences between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$170.0	$173.2	$3.0	$6.1	-$0.4	-$0.5
Other mineral related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing related	$1.1	$1.1	$0.0	$0.0	$0.0	$0.0
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$231.0***	***$246.2***	***$27.0***	***$42.0***	***-$0.4***	***-$0.5***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative C would provide less protection for non-market values than Alternatives A or B, but more protection than Alternative D or the No Action Alternative.

2.60.1.1.5 Projected Economic Effects under Alternative D

Table 2-63 summarizes projected employment directly and indirectly related to activities on CFO-managed lands, as well as BLM direct employment and expenditures, under Alternative D. BLM employment and expenditures are budget constrained and are projected to remain the same under any of the alternatives.

Alternative D is projected to support approximately 96 more jobs by the tenth year of the planning period than the No Action Alternative and approximately 142 more jobs by the end of the 20-year planning period. Alternative D is the only action alternative projected to support more total employment than the No Action Alternative.

Table 2-63. Summary of Projected Direct and Indirect Employment Effects under Alternative D

Jobs	Projections for Alternative D		Projected Differences between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	11,086	11,345	308	567	96	142
Other mineral related	3,460	4,152	1,384	2,076	0	0
Grazing related	137	137	0	0	0	0
Recreation related	104	116	12	24	0	0
BLM employment and spending related*	NA	NA	NA	NA	NA	NA
Total jobs	***14,787***	***15,750***	***1,704***	***2,667***	***96***	***142***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative D would also produce the most state and local tax revenue among the alternatives. State and local tax revenues under Alternative D are projected to be approximately $1.0 million more than under the

No Action Alternative in year 10 of the planning period and approximately $1.6 million per year more than under the No Action Alternative by the end of the planning period. These effects are summarized in Table 2-64.

Table 2-64. Summary of Projected Direct and Indirect Effects on Annual State and Local Tax Revenues under Alternative D (millions of 2014 dollars)

Revenues	Projections for Alternative D		Projected Differences between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$135.8	$139.3	$3.8	$7.3	$1.0	$1.6
Other mineral related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing related	$1.1	$1.1	$0.0	$0.0	$0.0	$0.0
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$173.1***	***$183.8***	***$18.3***	***$29.0***	***$1.0***	***$1.6***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Similarly, annual federal revenues related to the CFO are projected to be approximately $1.5 million more than under the No Action Alternative by year 10 of the planning period and approximately $2.2 million per year more than the No Action Alternative by the end of the planning period. These effects are summarized in Table 2-65.

Table 2-65. Summary of Projected Direct and Indirect Effects on Annual Federal Tax Revenues under Alternative D (millions of 2014 dollars)

Revenues	Projections for Alternative D		Projected Differences between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas related	$171.9	$175.9	$4.8	$8.9	$1.5	$2.2
Other mineral related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing related	$1.1	$1.1	$0.00	$0.00	$0.0	$0.0
Recreation related*	NA	NA	NA	NA	NA	NA
BLM employment and spending related†	NA	NA	NA	NA	NA	NA
Total revenue	***$232.9***	***$248.9***	***$28.8***	***$44.8***	***$1.5***	***$2.2***

Note: Table data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative D would provide the least protection for non-market values among the action alternatives.

Chapter 3:
Affected Environment

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Chapter 3: Affected Environment

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3.1 INTRODUCTION

Chapter 3 describes the current conditions and foreseeable future trends for resources, resource uses, special designations, and social and economic values within the planning area (see Map 3-1 in Appendix B). Where appropriate, indicators are presented for each resource or resource use to further describe current conditions. Information from this chapter will inform the analysis of effects from implementation of the proposed alternatives presented in Chapter 2. The impacts analysis is presented in Chapter 4.

This chapter also presents the best available data, which has been gathered from a variety of sources, including the Bureau of Land Management (BLM) Carlsbad Field Office (CFO), other agencies, published and unpublished reports, databases, and websites. In other cases, the BLM CFO has conducted new inventories for certain resources to present the most up to date data (such as for visual resources and travel management).

3.2 RESOURCES

3.2.1 Regional Context

The planning area is located within four different Level III U.S. Environmental Protection Agency (EPA) ecoregions as presented in Table 3-1.

Table 3-1. U.S. Environmental Protection Agency Ecoregions Pertinent to the Planning Area

Level III EPA Ecoregion	Percentage of the Planning Area
New Mexico Mountains	8.78
Chihuahuan Desert	47.29
High Plains	37.47
Southwestern Tablelands	6.46

Source: EPA (2014)

3.2.1.1 New Mexico Mountains

The New Mexico Mountains are distinguished from neighboring mountainous ecoregions by their lower elevations and an associated vegetation indicative of drier, warmer environments due, in part, to the region's more southerly location. Piñon-juniper and oak woodlands occur at lower and middle elevations, and the higher elevations are mostly covered with open to dense ponderosa pine (*Pinus ponderosa*) forests. These mountains are the northern extent of some Mexican plant and animal species. Surrounded by deserts or grasslands, the New Mexico Mountains in Arizona and New Mexico can be considered biogeographical islands.

3.2.1.2 Chihuahuan Desert

This desert ecoregion extends from the Madrean Archipelago (79) in southeast Arizona to the Edwards Plateau (30) in south-central Texas. It is the northern portion of the southernmost desert in North America that extends more than 500 miles south into Mexico. It is generally a continuation of basin and range terrain that is typical of the Mojave Basin and Range (14) and Sonoran Basin and Range (81) ecoregions to the west, although the pattern of alternating mountains and valleys is not as pronounced. The mountain ranges are a geologic mix of Tertiary volcanic and intrusive granitic rocks, Paleozoic sedimentary layers, and some Precambrian granitic plutonic rocks. Outside the major river drainages, such as the Rio Grande and Pecos River in New Mexico and Texas, the landscape is largely internally drained. Vegetative cover is predominantly desert grassland and arid shrubland, except for high elevation islands of oak, juniper, and piñon pine (*Pinus edulis*) woodland. The extent of desert shrubland is increasing across lowlands and mountain foothills due to gradual desertification caused, in part, by historical fire suppression (Natural Resources Conservation Service [NRCS] 2013) and livestock grazing.

3.2.1.3 High Plains

Higher and drier than the Central Great Plains (27) to the east and, in contrast to the irregular, mostly grassland or grazing land of the Northwestern Great Plains (43) to the north, much of the High Plains is characterized by smooth to slightly irregular plains with a high percentage of cropland. Grama-buffalo grass (*Bouteloua-Buchloe* sp.) is the potential natural vegetation in this region, with primarily wheatgrass-needlegrass (family Poaceae) to the north, Trans-Pecos shrub savanna to the south, and taller grasses to the east.

3.2.1.4 Southwestern Tablelands

The Southwestern Tablelands flank the High Plains (25) with red-hued canyons, mesas, badlands, and dissected river breaks. Unlike most adjacent Great Plains ecological regions, little of the Southwestern Tablelands is in cropland. Much of this region is in sub-humid grassland and semiarid rangeland. The potential natural vegetation is grama-buffalo grass with some mesquite-buffalo grass (*Prosopis-Bouteloua* sp.) in the southeast, juniper-scrub oak-midgrass savanna on escarpment bluffs, and shinnery (midgrass prairie with open low and shrubs) along the Canadian River.

3.2.1.4.1 Rapid Ecoregional Assessments

Climate change and other widespread environmental influences are affecting the western landscapes that are managed, in part, by the BLM. In response, the BLM has launched 14 Rapid Ecoregional Assessments (REAs) since 2010 to improve the understanding of the existing condition of these landscapes and how conditions may be altered by ongoing environmental changes and land use demands.

Two REAs apply to the planning area: 1) the Chihuahuan Desert REA, which encompasses the corresponding ecoregion, and 2) the Southern Great Plains REA, which encompasses the High Plains ecoregion. The REAs examine ecological values, conditions, and trends within ecoregions, which are large, connected areas that have similar environmental characteristics. These REAs are slated for publication in 2016 or 2017.

3.2.2 Soil and Water Resources

3.2.2.1 Soils

Soils in the planning area are diverse, with great differences in soil properties within short distances. The distribution of soils is dependent on many factors, including the interaction of relief (slope), parent material (geology), living organisms, climate, and time. These variables create complex and diverse soil patterns that influence soil resource use and its management.

The BLM uses indicators to determine soil and site stability for certain uses. Indicators are key soil characteristics that are sensitive to change in the environment. Indicators of soil resource condition (quality) can be categorized into four general groups: visual, physical, chemical, and biological. Visual indicators are those that are related to changes caused by environmental factors, such as wind or water. Physical indicators are related to the arrangement of solid particles and pores. The soil's chemical condition affects soil-plant relations, water quality, buffering capacities, availability of nutrients and water to plants and other organisms, mobility of contaminants, and some physical conditions, such as the tendency for crust to form. Biological indicators reflect activities of living organisms and their influence on soil health. Examples of these indicators are:

- **Erodibility:** sensitivity of the soil structure to the effects of wind and water and/or susceptibility of soil to erosion.
- **Reclamation potential:** ability of the soil to regain vegetative cover, once the cover has been lost.
- **Visual:** exposure of subsoil, change in soil color, ephemeral gullies, ponding, runoff, plant response, weed species, blowing soil, plant roots exposed, and deposition.
- **Physical:** depth, bulk density, porosity, aggregate stability, texture, crusting, and compaction. Physical indicators primarily reflect limitations to root growth, seedling emergence, infiltration, or movement of water within the soil profile.
- **Chemical:** pH, salinity, organic matter, cation-exchange capacity, nutrient cycling, and the concentrations of elements that may be potential contaminants or those that are needed for plant growth and development.
- **Biological:** measurements of micro- and macro-organisms, their activity, or byproducts.

The Standards for Rangeland Health assessment process is followed using both visual observations for factors including flow patterns and gullies and measurements for things such as percent bare ground and depth of soil horizons.

3.2.2.1.1 Current Condition

The planning area's soils are grouped geographically by Land Resource Regions (LRRs) and Major Land Resource Areas (MLRAs). The planning area lies within regions LRR D (Western Range and Irrigated Region), LRR G (Western Great Plains Range and Irrigated Region), and LRR H (Central Great Plains Winter Wheat and Range Region) in MLRAs 39, 42, 70D, and 77D.

MLRA 39 (Arizona and New Mexico Mountains) is an area of gently dipping sedimentary rocks eroded into plateaus, valleys, and deep canyons. The dominant soil orders are Inceptisols (weakly developed subsurface horizons), Mollisols (grassland soils), Alfisols (slightly leached soils with clay in the subsurface), and Entisols (soils with little or no development). Most of the soils are well drained and loamy with a mesic, or moderately moist, soil temperature regime. Most of these soils have a shallow to very shallow profile depth over a layer of hardened lime or bedrock.

MLRA 42 (Southern Desertic Basins, Plains, and Mountains) is an area of desert basins and broad valleys between mountain ranges. The dominant soil orders are Aridisols (dry soils with lime), Entisols, Mollisols, and Vertisols (clay soils). Most have a thermic (warm) soil temperature regime and an aridic (dry) soil moisture regime with carbonatic (limy) or mixed mineralogy. The soils generally are moderately deep to very deep, well drained, and loamy or clayey. Some of the soils are shallow or very shallow over a petrocalcic horizon or bedrock.

MLRA 70D (Southern Desert Foothills) is an area of nearly level to rolling or steep limestone hills with intermittent drainageways. The dominant soil orders are Aridisols and Mollisols. These soils have a thermic soil temperature regime, an aridic soil moisture regime, and carbonatic or mixed mineralogy. They are mostly shallow, well drained, and loamy-skeletal.

MLRA 77D (Southern High Plains, Southwestern Part) is characterized by large areas of open plains on an elevated plateau. The dominant soil orders in this area are Aridisols and Entisols. The soils in the area dominantly have a thermic soil temperature regime, an aridic soil moisture regime, and mixed or siliceous mineralogy. They are very shallow to very deep, well drained, and generally loamy or sandy.

General soils information for the planning area was obtained from the U.S. General Soils Map (NRCS 2006a). More detailed information was obtained from the Soil Survey Geographic Database (SSURGO). Over 100 general map units, representing many unique soil series, are present in the planning area; however, 10 map units comprise approximately 44% of the soils in the planning area. Soils within the planning area can be broadly described as loamy (243,391 acres of public land), sandy (999,797 acres of public land), shallow (692,941 acres of public land), or gypsum (156,479 acres of public land) (see Map 3-2 in Appendix B). These soils are generally well drained, low in organic matter, and have a moderate permeability. When undisturbed, soils in the planning area are generally in good condition and capable of producing forage and maintaining watershed integrity and surface water quality.

Based on descriptions from the soil surveys, approximately 60% of the soils are uneroded or slightly eroded, 30% are slight to moderately eroded, and 10% are moderately to severely eroded. All soils need good management to maintain a vegetative cover adequate to protect them from erosion, and all are subject to erosion if the vegetative cover is lost. Once this cover is lost, reclamation potential is low due to high temperatures and undependable rainfall.

The major soil resource concerns in the planning area are wind and water erosion where the ground cover has deteriorated (U.S. Department of Agriculture [USDA] Agriculture Handbook 296; NRCS 2006a). Soil landscape position, steepness of slope, physical properties (including texture and structure), loss of vegetation cover, and chemical properties contribute to increased susceptibility to wind and water erosion. Because of high summer temperatures, undependable rainfall, low soil fertility, and shallow depth of topsoil, revegetation can be difficult if the native vegetation becomes seriously depleted.

The most significant regional or national demand placed on soils in the planning area results from the development of fluid and non-fluid mineral resources. Locally, soils are also impacted by a variety of surface uses such as livestock grazing, cross-country motorized vehicle use, development of recreation facilities (e.g., trails and campgrounds), development of rights-of-way (ROWs), fire suppression activities, and the

use of prescribed fire. Soil disturbance can result from actions such as oil and gas development, mining operations, livestock grazing, fire suppression, prescribed fire, and cross-country motorized vehicle use. The initial disturbance creates the greatest impact, while, over the long term, these disturbance values diminish due to the estimated results of best management practices (BMPs), to include interim reclamation, over the life of the plan.

3.2.2.1.2 Trends

Rangeland health assessments indicate that most of the planning area is maintaining long-term soil productivity. In general, reclamation techniques have proven successful after several growing seasons, allowing surface-disturbing activities to continue. Although much of the reclamation success depends on the timing and amount of precipitation, vegetative cover on disturbed sites has improved as a result of limiting the initial disturbance, completing interim reclamation, and following detailed final reclamation plans. No long-term soil impacts have been identified as a result of fire suppression activities or the use of prescribed fire.

3.2.2.1.3 Key Features

Sensitive gypsum soils are found throughout the planning area and comprise approximately 156,479 acres. These gypsum soils are broken, eroded exposures of gypsiferous rocks and earths or shallow loams over these gypsiferous materials. In gypsum soils, the organic matter content is low and the vegetative cover is sparse, which leads to rapid runoff and a decrease in water-holding capacity. Plant roots are limited by salinity and the gypsiferous layer close to the surface; these soils are subject to severe erosion if the vegetative cover is lost. Therefore, gypsum soils are highly sensitive to disturbance and difficult to reclaim if impacted.

In addition, the survival of the following BLM sensitive plant species (see Appendix Q) are directly dependent upon the existence and health of gypsum soils: Allred's flax (*Linum allredii*), gypsum milkvetch (*Astragalus gypsodes*), Gypsum wild buckwheat (*Eriogonum gypsophilum*), Scheer's beehive cactus (*Coryphantha robustispina* var. *scheeri*), Sneed's pincushion cactus (*Escobaria sneedii var. sneedii*), and Tharp's bluestar (*Amsonia tharpii*).

Soils derived from limestone material have more acidity. Soils with a limestone component are also important to the survival of the following BLM sensitive plant species (see Appendix Q): Chaplin's columbine (*Aquilegia chrysantha* var. *chaplinei*), Guadalupe fescue (*Festuca ligulata*), Guadalupe penstemon (*Penstemon cardinalis* var. *regalis*), Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *sneedii*), Lee's pincushion cactus (*Coryphantha sneedii* var. *leei*), Scheer's pincushion cactus, Sneed's pincushion cactus, and Tharp's bluestar.

Open dune land makes up about 3,300 acres of public land. These areas are made up of wind-drifted sands that shift and blow freely. Keeping a good vegetative cover and avoiding surface disturbance are key to preventing active dunes from forming. Once plant cover is lost, revegetation is unlikely because of soil destabilization, increased erosion, and low annual precipitation rates.

As noted above, major soil resource concerns in the planning area are wind and water erosion where the ground cover has deteriorated (USDA Agriculture Handbook 296; NRCS 2006a).

3.2.2.2 Microbiotic Soil Crusts

Microbiotic soil crusts (MSCs) are very important to the development and maintenance of a healthy ecosystem because they fill roles in the environment, such as providing nutrients to plant communities, adding to species diversity, and protecting soils from erosion. The planning area is considered a warm, low-elevation desert that supports a large variety of MSCs. MSCs constitute up to 70% of the living cover in a range of plant communities (Belnap 1994). In many arid and semiarid habitats, such as the planning area, there are commonly more species associated with the MSC at a given site than there are vascular plants (Rosentreter 1986; Ponzetti et al. 1998).

3.2.2.2.1 Current Condition

Rangeland managers in North America have historically used key indicator plants such as sideoats (*Bouteloua curtipendula*), black grama (*B. eriopoda*), and blue grama (*B. gracilis*), as well as various dropseeds (*Sporobolus* sp.) for determining the ecological trend and health of vegetation (USDA 1937; Stoddart et al. 1943) and as indicators of ecological health. More recently, MSCs have also begun to be used as indicators of ecological trend and health of the land, along with indicating abiotic factors, such as the presence of calcareous (calcium carbonate containing) soils. Currently, only the presence or absence of MSCs and general classes, such as lichen, mosses, or cyanobacterial, are being used as indicators. No assessments on the condition of these populations have been conducted.

No formal inventory or monitoring system is currently in place. Current conditions for MSCs within the planning area are little known, although some of the permanent rangeland monitoring plots have recorded the presence of these species.

In the loamy, shallow, and gypsum soil areas, where disturbance has been minimal, there seems to be healthy populations of MSCs. Throughout the entire planning area, there are 243,391 acres of loamy soils, 692,941 acres of shallow soils, 156,479 acres of gypsum soils, and 999,797 acres of sandy soils on public lands. Loamy soils average 15% cover, shallow soils average 10%, and gypsum soils average 20% MSC cover. In sandy soils, few crusts have been observed, and those found are generally cyanobacteria. The potential to find MSCs in actively moving, unvegetated sand is low, and there is only a slightly higher potential for them to be found in sandy soils where vegetation cover reduces the movement of sand. In areas of MSC loss, trampling during historic livestock grazing and wildlife herd migration, along with current day energy exploration and potash development, may have resulted in crust compaction or burying. Within the planning area, more inventories are needed to show what areas have MSCs present, and monitoring in areas of concern is essential to understanding any population trends. Generally, unlike vascular plants, crustal organisms are not greatly influenced by short-term climatic conditions. However, MSCs and lichens, in particular, respond to environmental factors differently than vascular plants over long time scales (McCune and Antos 1982). Thus, MSC could be used to characterize the long-term ecosystem health and disturbance trends.

While little information exists within the planning area, it is anticipated that as surface-disturbing activities continue, loss of MSCs populations would occur.

3.2.2.2.2 Trends

More inventories are needed to show what areas have MSCs present and monitoring in areas of concern is essential to understanding population trends. Generally, unlike vascular plants, crustal organisms are not greatly influenced by short-term climatic conditions. MSCs and lichens, in particular, respond to environmental factors differently from and on separate, longer time scales than vascular plants (McCune and Antos 1982). This characteristic may make MSCs ideal indicators of long-term ecosystem health, as each community component can provide information that may complement, explain, or indicate something about a site's characteristics and disturbance history.

3.2.2.2.3 Key Features

MSCs are known to occur throughout the CFO planning area. The Yeso Hills (7,500 acres) and Seven Rivers Hills (460 acres) areas are two locations, in particular, that are made up mostly of gypsum-based soils that have unique MSC cover. The precipitation, soil composition, and vegetative components in these areas are conducive to forming ideal habitat for crusts. The low soil fertility and lack of organic material create habitat where fewer vascular plants can survive but create a unique opportunity for MSCs to thrive. Where MSCs require significantly less moisture to live, they make up a large portion of the species diversity of these two areas; as well as other areas within the CFO planning area.

3.2.2.3 Water Resources

Water resources are typically described by four categories: surface water quantity, surface water quality, groundwater quantity, and groundwater quality. In the planning area, the BLM collects stream flow and water quality data for surface water bodies and monitors several agency-owned wells in Capitan Reef. The BLM has also participated in aquifer studies to evaluate water quantity in the Dewey Lake aquifer and several shallow aquifers in high-potential oil and gas areas. Other federal and state agencies have primary responsibility for New Mexico's water quantity and quality data. These agencies include the U.S. Geological Survey (USGS), the New Mexico Office of the State Engineer (NMOSE), the New Mexico Water Quality Control Commission, the New Mexico Environment Department (NMED), and the New Mexico Oil Conservation Division (NMOCD). These agencies collect most of the data for water resources in the planning area.

3.2.2.3.1 Current Condition

The following indicators are used when discussing water quantity and quality:

- Surface Water Quantity (Flows and Volume) – Each system should have flows and volumes appropriate to meet its beneficial uses, such as irrigation, recreation, or wildlife habitat.
- Surface Water Quality: Listing of a reach as impaired under the Clean Water Act (CWA) Section 303(d).
- Groundwater Quantity (Groundwater Elevations and Well Capacities) – Natural fluctuations in groundwater elevations are normal from year to year and with seasonal use; however, long-term downward trends in groundwater indicate overuse and negatively affect groundwater quantity. As the amount of water available in a given well (well capacity) decreases, it can also indicate that overall usable groundwater quantity is diminishing.
- Groundwater Quality: Although groundwater quality varies naturally throughout the planning area, certain uses of groundwater, such as agriculture and mining, can artificially increase concentrations of nitrates or salt. Disposal of produced water via injection wells have the potential to diminish groundwater quality through equipment failures or other means if the produced water is mingled with usable natural groundwater. Groundwater quality is important because it is the main source of water by municipalities, private homes, and ranchers in the planning area.

Surface Water Quantity

The planning area contains a variety of surface waters, including springs, seeps, lakes, playas, rivers, and ephemeral drainages. There are approximately 273 miles of streams and rivers, 75 springs, 901 acres of lakes, and 62,058 acres of playas in the planning area falling within 12 watersheds, shown by the hydrologic unit codes (HUCs) in Table S.1, Appendix S. Four major streams or rivers are within the planning area (Table S.2, Appendix S), and three major lakes are surrounded by BLM-administered lands (Table S.3, Appendix S). Waters from spring developments, reservoirs or streams, and stream diversions within the planning area are used primarily for irrigation, livestock, and wildlife. Diversions on BLM-administered lands support private land crop irrigation and stock water needs. The BLM does not maintain records of stream flow in the area; however, the USGS maintains 20 stream flow gages in the planning area.

Other surface waters found on BLM-administered lands include shoreline and open water habitat on lakes, reservoirs, ponds, and playas. Some of these are seasonally dry and others are fed by regional groundwater flows. Within the planning area, streams and other surface waters are found within a wide variety of elevations, topographic settings, and landscapes. Several rivers and other surface water features in the area are created or affected by the karst terrain underlying the region. Karst terrain develops when underground soluble rocks are dissolved, resulting in topographic and subsurface solution features.

Stream and river conditions vary widely, from completely undisturbed river and vegetative communities in the mountainous highlands, to deep, erodible soil banks at lower elevations where livestock, recreationists, and other public users have access to stream and riverbanks.

Surface Water Quality

Water quality in streams flowing on BLM-administered land is influenced by both natural water quality with regard to salinity content and the intensity of human and industrial activity in the watershed. For example, water quality may be vastly different in a remote mountain spring creek than in waters with natural brine discharge, or where there are human impacts due to urban, farming, ranching, or industrial activity. Chemistry samples of surface water in the planning region are needed in order to establish a baseline chemistry data for the waters. Variances in baseline chemistry can indicate water quality changes attributable to land use development. In addition, the overall health of the riparian areas can be used as an indicator of water quality.

The dominant legislation affecting national water quality and BLM compliance with New Mexico water quality requirements is the Clean Water Act (CWA) or Federal Water Pollution Control Act. Within the planning area, total maximum daily loads (TMDLs) determinations are not in place for any of the watersheds with 303(d)-listed streams. Thus, an assessment of their condition via this metric is not possible at the time. The most common pollutants for waters in the planning area are sediment, mercury, and dissolved salts. Beneficial uses listed for these waters are industrial water supply, irrigation storage, livestock watering, recreation, warm water fishery, and wildlife habitat.

The CFO manages approximately 30.3 miles of stream banks of the 2008 Section 303(d)-listed streams, which is approximately 66% of the 45.9 total miles of Section 303(d)-listed streams in the planning area. Table S.4 in Appendix S lists the 2008 303(d)-listed streams in the planning area and their pollutants; Table S.5 in Appendix S lists the Section 303(d)-listed lakes and their pollutants. Avalon Reservoir is the only lake completely surrounded by BLM-administered lands. Map 3-3 in Appendix B displays these streams and the watersheds in the planning area.

Groundwater Quantity

Groundwater in the planning area exists in shallow, unconsolidated sediment along streams and valleys, as well as in deeper limestone and alluvial sediments. Groundwater flow under BLM-administered lands is generally toward the Pecos River, which flows through the central part of Eddy County. The main source for municipal water supply in the planning area is groundwater. The main aquifers used in the area are the Capitan Aquifer, a limestone reef complex that forms the northern border of the Delaware Basin; the Ogallala Aquifer, a buried ancient alluvial fan in the High Plains region; and, to a lesser extent, the groundwater from the Salado, Rustler, Dewey Lake, and Santa Rosa Formations that are used for ranching and industry in the lesser-populated areas of the Delaware Basin area.

Groundwater levels typically rise and fall annually in response to precipitation, recharge, and pumping. Across the Delaware Basin, water levels are usually highest from October to March and lowest in July and August where areas are irrigated with groundwater. In the eastern part of the basin, water levels in the deep Capitan Reef wells (4,500 feet in depth) monitored by the BLM have shown a rise of more than 500 feet since the 1970s. Groundwater data from the only groundwater well monitored in real-time by the USGS in Eddy County from 1963 to 2010 showed water levels to fluctuate around 15 feet annually. Recharge to the aquifer from average annual precipitation over the regional groundwater system was estimated to be less than 1% of precipitation due in part to high rates of water evaporation and plant transpiration; however, water levels for aquifers that have direct recharge from precipitation, such as in the Rustler Formation (specifically in Burton Flats and Nash Draw) may be recharged to maximum water levels with one storm event. The groundwater system is recharged from infiltration of precipitation and from infiltration into the aquifer from rivers, streams, and associated irrigation canals and ditches. Important areas of recharge to the aquifers include playas, sinkholes, caves, and other karst features. Karst terrain covers over one million acres of the planning area, encompassing almost one-third of its area. Buried caliche layers can prevent precipitation from directly penetrating into buried aquifers, even after infiltrating the vadose zone. However, the karst features in the area provide a direct conduit, through the caliche layers, to allow recharge into the aquifers or local streams.

Aquifer discharge consists largely of spring flows throughout the region, surface flow contributions to rivers, and well pumping.

The Capitan Aquifer is a karst aquifer capable of providing large quantities of fresh water and is the main source of drinking water for Carlsbad (see Map 3-4 in Appendix B). Currently a Wellhead Protection Program[1] is located southwest of Carlsbad, near the foothills of the Guadalupe Mountains in Sheep Draw, although the entire Guadalupe Mountain complex is recognized as the recharge area for this aquifer. Transmissivity is the term used to quantify the flow of water through an aquifer. The Capitan Aquifer has transmissivities that have been measured averaging 0.0624 square feet per second (Gates et al. 1980) and as high as 0.1872 square feet per second (Reed 1965).

The Ogallala Aquifer is an unconfined aquifer made up of alluvial sediments and is used by Lea County as its primary source of drinking water. All recharge comes from precipitation that falls over the aquifer's area and recharge rates vary by precipitation rates, soil type, and type and amount of vegetation. Average rates of recharge for the High Plains aquifer system are less than 1 inch per year, making this aquifer vulnerable to depletion from overuse. Results of investigations by the NMOSE report that groundwater levels have dropped in this aquifer by as much as 97 feet from predevelopment levels (1914–1954). Rates of depletion have been calculated to be as much as 0.88 foot per year (Tillary 2008).

Less is known about the groundwater found in the Salado, Rustler, Dewey Lake, and Santa Rosa Formations in the planning area. The usable groundwater in these formations is found mainly in discontinuous channel sands scattered throughout the sparsely populated portions of Eddy and Lea Counties. Use of this source of groundwater is mainly for stock watering, although industrial use of this water has been proposed and is currently being evaluated. The extent and quality of the Salado, Rustler, Dewey Lake, and Santa Rosa Formations are still being explored, though it is known that these aquifers are less continuous, have smaller yields, and exhibit varying water quality when compared to the Capitan and Ogallala Aquifers. Groundwater levels are not currently monitored in the planning area, nor are pump tests performed to measure regional aquifer properties or individual well production. In 2011, shallow groundwater monitoring wells were installed along the Pecos and Delaware Rivers to further delineate surface water and groundwater relationships.

Groundwater Quality

Groundwater quality on BLM-administered lands throughout the planning area is variable. Some of this variability is due to groundwater salinity from the dissolution of rocks. The main water quality issues, besides natural variability, are due to historical and modern industrial development of oil and gas wells and potash mining where accidental or purposeful discharges of brine or supersaturated industrial wastewater have gone directly or indirectly into the groundwater. Irrigated agriculture is also a concern for groundwater quality, because irrigation return water that infiltrates back into the groundwater in channels and ditches can carry dissolved nitrates from fertilizers and salts. Over time, these increases in salts and nitrates can diminish groundwater quality.

3.2.2.3.2 Trends

Surface Water Quantity

Stream flow and lake volumes can vary based on climatic conditions (wet and dry cycles), upstream surface water diversions, and groundwater pumping that induces surface water leakage. In general, recent drought cycles have resulted in stream flows that are below historical averages. Overall, the current trend in surface water quantity is a slight reduction in flow resulting primarily from drought cycles common to the southwestern United States.

Historical practices, such as overgrazing, have also affected surface water quantity. The vegetation in the watersheds changed from primarily grasslands prior to cattle grazing in the late 1800s to primarily woody shrubs, such as mesquite (*Prosopis* sp.), and creosote bush (*Larrea tridentata*) in the present. This change in vegetation has led to more surface runoff from rainfall and less infiltration to groundwater. In turn, this has resulted in more flash flooding and surface water declines. As the science of healthy watersheds is

[1] The National Wellhead Protection Program (WHPP) was established by the Safe Drinking Water Act in 1986. It mandated that states develop WHPPs to protect groundwater supplies from contamination.

studied and hydrological processes are better understood and defined through scientific research, current land management practices that restore grasslands and healthy watersheds positively affect surface water flows. Many acres adjacent to the Delaware River have been chemically treated to favor grasslands and, since that time, flows in the Delaware River have been restored and increased.

Surface Water Quality

Identifying a trend for changes in listed 303(d) streams is difficult due to limited existing data on these waters. This lack of information limits the ability to predict changes in trends due to site-specific impacts of unknown future actions.

Groundwater Quantity

Over the region, groundwater elevations have declined with use as a result of urban population growth, industrial uses, and increased groundwater use for irrigation. Water use from the aquifers exceeds recharge rates, which is leading to groundwater-level declines. The rates of decline vary depending on the aquifer. Since 1963, 43 years of data collection on the alluvium well in Eddy County by the USGS shows a 10-foot decline in water levels (USGS 2012). The city of Hobbs in Lea County has had significant declines in its water supply, the Ogallala Aquifer (USGS 2012).

Groundwater Quality

The CFO has not directly investigated groundwater quality in this area. In general, groundwater quality is vulnerable to pollution, whether it is an unconfined aquifer or a confined aquifer, because of the widespread karst terrain in the region. Water and pollutants can travel significant distances in short periods of time and are very difficult to clean up once released into the environment. More study is needed to ascertain travel paths and times in these unique karst regions, especially where industry is developing in sensitive areas.

3.2.2.3.3 Key Features

The primary aquifer for the planning area is the Capitan Aquifer. The planning area also includes portions of the Roswell Basin and the High Plains aquifer systems, which include the Ogallala Aquifer; these aquifers provide drinking water for the municipalities in the area and provide water sources for irrigation, livestock, and industry. Table 3-2 lists the amount of declared groundwater in acres by water basin.

Table 3-2. Carlsbad Field Office Underground Water Basins Declared Groundwater

Water Basin	Acre/Feet
Capitan	1,009,231
Carlsbad	1,526,312
Lea County	1,715,397
Jal	9,364
Peñasco	135,212
Roswell	1,775,254

Source: NMOSE (2012)

Water Rights

New Mexico's water law, managed by the NMOSE, is based on the doctrine of prior appropriation or "first in time, first in right." All waters in New Mexico are declared to be public and subject to appropriation for beneficial use. In order to satisfy delivery obligations under the Pecos River Compact, New Mexico purchases water rights from appropriators on the Pecos River. The purchased water, instead of being used for irrigation, is allowed to flow downstream into Texas.

3.2.3 Cave/Karst Resources

The planning area includes over 1 million acres of karst terrain (BLM 2014a), including more than 1,000 documented cave features. Karst is a landscape produced by the dissolution of soluble rock types such as limestone, dolomite, marble, gypsum, or salt (Palmer 1990). Features associated with karst terrains include

sinkholes or closed depressions, caves, dry valleys, sinking streams, and resurgences or springs. A cave is defined as any naturally occurring void, cavity, recess, or system of interconnected passages occurring beneath the surface of the Earth that is large enough to permit an individual to enter, whether or not the entrance is naturally formed or human-made (Federal Cave Resources Protection Act of 1988 [FCRPA], 16 United States Code [USC] 63.4301, et seq.). A cave resource is any resource occurring within a cave. These can be biological, geological, mineralogical, paleontological, cultural, hydrologic, or another attribute specific to a certain cave (43 CFR 37).

The acreage of karst terrain in the planning area is nearly equally divided between gypsum and limestone karst. The BLM categorizes all areas within the CFO as having either low, medium, or high karst potential occurrence based on geology, occurrence of known caves, and density of known karst features (Refer to BLM Management Handbook H-8380-1 for definitions of zones). These zones were identified using geologic maps and known cave and karst features. Boundaries were based on the density and extent of surface and subsurface karst features respectively, and also on surface and subsurface drainage. Exact boundaries have not been field verified and, as such, may be subject to modification as additional information is gathered.

In addition to these areas, the BLM has delineated a critical karst resource zone, which is defined as an area with a high density of significant cave systems and/or bedrock fractures and other karst features that lead to the rapid recharge of karst groundwater aquifers from surface runoff. These areas provide critical drinking water supplies for major communities, ranching operations, and springs that support rivers and vital riparian habitat. These areas include the Capitan Reef and associated Capitan Aquifer west of the Pecos River, as well as the surface outcropping of the Castile Gypsum formation in southern Eddy County. Gypsum karst, primarily found north, east, and southeast of the cities of Carlsbad and Artesia, contain the longest gypsum cave systems on federal lands in the United States. These water sources are used by city communities, rural ranching communities, and wildlife.

The limestone karst regions west and southwest of the city of Carlsbad are known worldwide for their cave resources (Hill 1987). Once a living reef on the edge of an inland sea, the Guadalupe Mountains are home to more than 500 known limestone caves, ranging from a few feet to over 142 miles of surveyed passage in length and up to 1,600 feet in depth. Around 50 limestone caves are intensively managed by the CFO. Many of these caves occur in clusters, such as on McKittrick Hill, where there are 12 known caves in roughly 2 square miles of land. Several of these cave areas comprise Special Management Areas (SMAs) or Research Natural Areas (RNAs) or are within Wilderness Study Areas (WSAs).

Carlsbad Caverns National Park, home to more than 120 known caves, including Carlsbad Cavern and Lechuguilla Cave, is bordered by BLM-administered lands. Carlsbad Caverns National Park received World Heritage Site designation in 1995 following “examples of the major stages of the earth’s history and outstanding geological features” and “superlative natural phenomena or natural beauty.” Justification specifically mentions the geological and biological processes found in Lechuguilla Cave, including bacterially assisted cave formations, or “biothems,” as well as incredibly delicate and world-class speleothems such as gypsum chandeliers, subaqueous helictites, and rare hydromagnesite balloons. Lechuguilla Cave is currently known, through physical human exploration and survey, to only lie beneath National Park Service (NPS)–administered lands. However, some passages come within 1,000 feet of BLM-administered lands. Geological studies suggest that some passages yet to be discovered could extend outside the Park boundary. Air studies conducted in Lechuguilla Cave and smaller caves on BLM-administered lands suggest that at least an air connection exists between these caves.

Many significant limestone karst features such as sinkholes, fractures, and fissures, as well as unique geological features, including extensive systems of joints and lineaments, indicate that many more cave systems exist with no currently known extensions to the surface under BLM-administered lands (see Map 3-5 in Appendix B for karst occurrence zones in the planning area). The Capitan Aquifer, the main domestic water source for the city of Carlsbad, is recharged primarily via the cave and karst features located in the Guadalupe Mountains (Hill 1987; Snow and Goodbar 2012).

Karst resources affect other resources, such as groundwater hydrologic systems and biological communities (Culver 1982; Holsinger 1988). Caves are complex because they are associated with many values, such as biological, cultural, geological, paleontological, and recreational. Caves are also extremely

sensitive ecosystems because of the delicate balance between the cave-adapted biological communities and the influences from the surface (Culver 1982). Additionally, subterranean ecosystems require a great length of time to respond to changes in their condition.

Caves and karst features in the CFO provide habitat that supports a very diverse ecosystem (Barr and Reddell 1967; Cokendolpher et al. 1996; Cokendolpher et al. 2004; Goodbar 2013). Several caves are used seasonally by large bat colonies to raise their offspring. Several cave-adapted species are found within the caves, as well as in the riparian areas created by cave waters resurging onto the surface. They include cave-adapted millipedes, beetles, spiders, harvestmen, pseudoscorpions, isopods, and amphipods.

3.2.3.1 Current Condition

The following indicators are used to determine the condition of karst resources:

- **Quality and quantity of associated groundwater:** Measurements in quantity and quality of water within caves, at cave resurgences, and at springs and wells within karst areas help assess impacts of surface and subsurface activities on cave environments. These impacts can include change in surface flow patterns that increase or decrease subsurface flow, introduction or remediation of contaminants, changes to natural recharge of karst aquifers, and changes in population densities of cave-adapted biological species.
- **Health of associated riparian areas:** Since many riparian areas in the planning area are results of karst groundwater discharge, the overall health of these riparian areas can be indicators of the current conditions of their associated karst system.

The following indicators are used to determine the condition of caves:

- **Human visitation caves:** Visual inspection of caves, when combined with results of past inspections, can be used to determine subtle and significant changes within a cave environment. Photo monitoring is the most effective means of visual inspection combined with documentation. Photo monitoring of specific cave resources and areas within caves allow observation of several indicators over time. Some indicators of level and type of human visitation include change in width and intensity of designated trails, broken speleothems (cave formations), modifications of cave passages, presence of human-influenced materials such as trash or mold, and disturbances to cultural or paleontological resources found within caves. The presence, intensity, or absence of certain bacteria usually associated with the presence of humans can be an indicator of the impact of human visitation on a cave's microbiota in certain areas.

  Health of biological communities: Monitoring of cave biology can help determine trends for the health of the cave ecosystem itself and the environment immediately around it. Two communities of interest are bats and invertebrates. Both bats and cave invertebrates are sensitive to disturbances and, therefore, provide a good indicator of changes within a cave environment. Bat population monitoring, for example, can indicate that management activities, such as cave gate design, visitor use, seasonal closures, or surface use around a cave entrance may need to be adjusted.

The planning area contains more than 1,000 documented cave features. Prior to the mid-1970s, the majority of the caves were recognized, explored, surveyed, and studied by various caving enthusiasts belonging to a variety of grottos, or caving clubs, organized under the National Speleological Society and the Cave Research Foundation. Three caves had been visited by Euro-Americans since the late 1800s. Several of the caves on McKittrick Hill were subject to early mining claims for the purpose of harvesting speleothems to sell as curios at nearby White's City. As a result of those activities, three major caves sustained heavy vandalism prior to the creation of the BLM and, certainly, before the BLM's recognition of the need for protection of cave resources.

Calm post-development environments have allowed for most of the limestone caves in the area to develop extensive speleothem displays. The spectrum and variety of speleothems is immense (Hill 1987). Massive 100-foot-tall column formations are present, as well as delicate selenite needle formations as thin as a human hair and sometimes several feet long. The aesthetic value associated with these speleothems draws cavers from all over the world to explore wild caves, as well as thousands of tourists who come to visit the

speleothem-filled chambers of Carlsbad Cavern. Current conditions of speleothems within CFO caves are mostly linked to a cave's discovery date or remoteness. Recently discovered caves (within the last 30 years) were quickly gated and managed to protect their sensitive resources. These caves remain relatively pristine with few broken or missing speleothems. Remote caves, such as those located in CFO WSAs, also fit into this category. More accessible caves that have been well known for some time have suffered heavy vandalism in terms of speleothem breakage.

Parks Ranch Cave is the most well-known gypsum cave in the planning area. It falls within the Chosa Draw Area of Critical Environmental Concern (ACEC) south of White's City. At over 4.5 miles long, Parks Ranch Cave is the longest gypsum cave on federal lands in the United States. It is also the most visited cave in the planning area and offers recreational caving, scientific research, and educational opportunities. Although heavily visited and open to anyone without an entry permit, Parks Ranch Cave has remained relatively pristine. It does not have the delicate speleothems found within limestone caves. One extensive case of vandalism by spray paint was quickly restored by volunteers.

Cultural evidence found in and around limestone and gypsum caves in the planning area suggest long-running and significant usage by Native Americans and Euro-Americans. Native Americans in the area used caves for food processing and storage, water sources, shelter, religious and ceremonial sites, and burial. Euro-Americans used caves in the Guadalupe Mountains for shelter, livestock pens and watering areas, tourist attractions, trash dumps, recreation, and illegal alcohol distilleries.

Some caves in the planning area have functioned as natural faunal traps for several thousand years (Morgan and Lucas 2006). These caves have yielded bones of mammals that are now extinct or no longer common in the Guadalupe Mountains. These caves have produced a unique stratified record of past Guadalupian mammal populations and local climate trends extending back through the Pleistocene era.

Most caves in the CFO that still contain cultural or paleontological resources within them have been gated. This has allowed these resources to remain in relatively pristine condition. Several excavations have occurred, with resources being removed and documented. Looting has occurred in several sites that are not restricted, resulting in loss of invaluable data.

Bat population monitoring has indicated an overall increase in population size. This can be greatly contributed to proactive management in limiting disturbance during roosting times and altering cave gates to be bat friendly. However, some roosts remain vulnerable due to the unrestricted access. One large roost, as of writing, has failed to return during the spring. Signs of increased human disturbance are visible outside this cave entrance. White Nose Syndrome (WNS) is a fungus (*Pseudogymnoascus destructans*) that affects bats during their hibernation. The disease caused by the fungus has an 80% to 95% mortality rate. It was first identified in a cave in New York in 2006 and has since spread across the eastern United States. It was also found to be present in Oklahoma and a site in Texas, 200 miles from New Mexico. In August 2010 the BLM developed a WNS response plan (IM-WO-2010-181) to guide states in developing their individual responses to the spreading disease. New Mexico developed a WNS Response Plan in November of 2010 that called for the closure of 21 significant bat caves to lessen the potential spread of WNS due to human transportation of the fungal spores on their caving equipment. These closures are still in place, with the exception of two caves that were removed due to the lack of recent bat activity. WNS research is ongoing but no definitive solutions to this problematic situation have been discovered. The BLM New Mexico is working with an interagency group for a coordinated response to the situation, which includes the decontamination of caving equipment between caves. This activity will most likely continue, primarily due to its efficacy in minimizing the spread of the fungal spores causing WNS. A comprehensive study on the cave invertebrates of the CFO has not been accomplished. However, many studies have been conducted on individual caves within the Guadalupe Mountains. Good baseline data are needed in many of the larger gypsum karst areas within the CFO.

Riparian areas associated with karst water discharge are currently meeting riparian properly functioning condition (PFC) standards.

Ongoing groundwater sampling and measurements are collecting useful information within karst areas of the CFO's jurisdiction. Although variable by area, the general assessment is that water associated with karst areas in the planning area is protectable by State of New Mexico standards. The Capitan Aquifer, a limestone karst aquifer, is primarily recharged through karst processes in the Guadalupe Mountains. This aquifer provides 98% of the municipal water source for the city of Carlsbad. Constant monitoring of this water shows seasonal changes in quality and quantity. A pilot dye tracing project within the CFO has shown positive connection between lost circulation zones encountered during oil and gas drilling in certain karst areas and area springs, seeps, rivers, caves, and water wells (Goodbar 2009b). This study did not measure quality or quantity of groundwater.

3.2.3.2 Trends

General interest in caves and cave resources has steadily increased within the area. The designation of Carlsbad Caverns National Park in the 1930s gave the Carlsbad area an international reputation as being a "cave area." Media attention has also drawn focus to the cave resources located here. Large media production companies such as National Geographic and the British Broadcasting Company have produced documentaries on the caves of the Guadalupe Mountains that have aired internationally.

Human visitation to caves has increased as more awareness of the existence of these resources has been brought to public attention. However, since the placement of gates and the implementation of a cave entry permit system in 1976, visitation numbers have remained fairly steady on caves that fall under that system. Visitation of non-gated caves is not permit-dependent. A voluntary cave-register system is used to track visitation at these sites. Registers placed in non-gated caves that are easily accessible show regular visitation, while those that are more remote show less visitation.

Visitation to caves containing sensitive bat roosts has essentially been cut in half as a result of the closure of these caves during roosting times.

Project caving activities and volunteerism within the cave program has remained steady since the 1960s. Large-scale projects, such as cave restoration, exploration, research, surveying, cartography, and documentation, are ongoing. These projects have helped reverse some of the negative impact from excessive or irresponsible human use. A slow but steady increase of commercial visitors is apparent in the numbers of Special Recreation Permits (SRPs) issued.

Increased visitation has resulted in impacts to karst resources. Impacts can be defined as, for example, speleothem breakage, trail wear and spread, mud, dust, or silt tracking, litter, graffiti. However, restoration efforts and permitting adjustments (e.g., frequency, limit) have helped curb these impacts. Impacts to biological communities, such as bat colonies, invertebrates, and microbial, may also occur. Caves that have uncontrolled access do show impact signs from increased visitation.

The occurrence of industrial activities related to oil and gas drilling and production within the planning area's karst areas has dramatically increased in the last two decades (Goodbar 2009a, 2009b). The discovery of hydrocarbons in these areas has led to the drilling of new wells, in addition to re-entry of previously abandoned wells. The presence of roads, power lines, pipelines, tank batteries, and other related facilities and equipment has also increased. The CFO is reviewing oil and gas lease parcel nominations containing karst concerns in almost every lease sale review. The majority of karst areas within the planning area have already been leased. Studies elsewhere have shown the ease in which karst aquifers can be contaminated due to leaks and spills (White 1998). Dye trace studies within the CFO have shown a positive connection between lost circulation zones encountered during drilling and karst aquifers (Goodbar 2009b). The project, conducted by the BLM, involved the inclusion of distinct dyes in drilling fluids (Goodbar 2009b). These dyes were successfully detected in charcoal packets placed in caves, rivers, springs, and water wells within a significant karst area in the southern portion of the CFO. Contamination of these aquifers may affect all users of these water sources, including riparian and in-cave biological communities. Impacts to karst groundwater aquifers and other cave and karst resources may result from surface production operations from hydrocarbons and saltwater spills and leaks.

There has been a trend over the past 10 years for an increase in research projects proposed in the CFO caves. A variety of research projects are being conducted, including microbial studies, paleoclimate studies, groundwater trace studies, and geophysical techniques to detect voids. On the average there are two to three ongoing research projects each year. Some of these projects are sponsored by the researchers through universities and some are funded directly through the BLM. In addition to the research projects, cave survey projects are often conducted in the CFO caves. These projects can extend over several years, depending on the complexity of the cave being surveyed. Some of the exploration projects also involve digging out collapsed debris to uncover existing passageways leading to additional rooms and other features within the cave.

3.2.3.3 Key Features

In the planning area, more than 500 documented cave features have been designated as significant under the FCRPA. Other caves have not yet been evaluated for significance determination. Per BLM policy, caves not yet evaluated are managed as significant until determined otherwise (BLM 8380 Manual [Cave and Karst Resources Management]).

Key karst areas occur in the CFO can largely be divided into two karst types: limestone and gypsum. The great majority of limestone caves within the CFO belong to the limestone members of the Capitan Reef. Because of their unique sulfuric acid speleogenesis, or development, the limestone caves of the Guadalupe Mountains have been and continue to be intensely studied by speleologists, hydrologists, and geologists. Being free of the erosional effects often associated with caves formed by flowing water, the caves offer scientists the opportunity to clearly study the Capitan Reef from the inside out. The Capitan Reef is recognized as the best example of a Permian-aged fossil reef in the world. Areas within the Capitan Reef displaying exceptional caves include McKittrick Hill, Dark Canyon, Serpentine Bends, Jurnigan Canyon, Fence Canyon, and Lonesome Ridge.

There are several significant gypsum karst areas located within the CFO. The Castile Formation, located in the southwestern portion of the planning area is one of the densest gypsum karst areas in the world. The caves in this area provide great recreational opportunities, as well as wildlife habitat and groundwater recharge. Several springs and Black River occur as a result of karst discharge in this area. Burton Flats and Sinkhole Flats, located in the gypsum units of the Rustler Formation, contain caves that enter freshwater aquifers and are home to unique cave adapted invertebrates.

Key features within these resources include items of hydrologic, paleontologic, geologic, biologic, mineralogic, and cultural importance. Aesthetic and recreational values are also key features possessed by many of the caves in the planning area. As such, karst and its associated resources are considered non-renewable.

Unique mineralogy, the absence of organics, and isolation from surface influence in some of the deeper caves have allowed the formation of extremophile microbial colonies in the planning area that are of great interest to microbiologists. Many of the microbial communities found by researchers have only been discovered within these caves. Contamination of the microbial communities endemic to Lechuguilla Cave has occurred as a result of exploration activities (Hunter et al. 2004).

3.2.4 Vegetative Communities

3.2.4.1 Upland Vegetation

- Upland vegetation systems within the planning area are managed according to *New Mexico Standards for Public Land Health and Guideline for Livestock Grazing Management* (BLM 2001a). Although these guidelines were developed specifically for grazing administration, they have broader applications, as they include standards for public land health and are intended for incorporation into the BLM's management goals and objectives. These standards, listed below, represent the conditions that the BLM strives to meet within the planning area with regard to resources and resource uses.

- **Upland Sites Standard:** Upland ecological sites are in a productive and sustainable condition within the capability of the site. Upland soils are stabilized and exhibit infiltration and permeability rates that are appropriate for the soil type, climate, and landform. The kind, amount, and pattern of vegetation provide protection on a given site to minimize erosion and assist in meeting state and tribal water quality standards.
- **Biotic Communities Standard:** Biotic communities include native, endangered, threatened, and special status species. Ecological processes, such as hydrologic cycle, nutrient cycle, and energy flow, support productive and diverse native biotic communities. Desired plant community goals include maintaining and conserving productive and diverse populations of plants and animals within the capability of the ecological site, which sustain ecological functions and processes.

3.2.4.1.1 Current Condition

Major Land Resource Areas

There are six major Land Resource Areas (MLRAs) as described by the NRCS (2006b) in the planning area, which are classified based on land use, elevation, topography, climate, water resources, potential natural vegetation, and soils (Table 3-3; Map 3-6). Appendix S's Vegetative Communities section provides descriptions of these MLRAs. A map of the information specific to each MLRA can be found in USDA Handbook 296 (USDA 2006).

Table 3-3. Major Land Resource Areas in the Planning Area

MLRAs	BLM Surface	
	Acres	Percent
Arizona and New Mexico Mountains	671	0.03
Central New Mexico Highlands	59,574	2.8
Southern Desert Foothills	626,709	29.3
Southern Desertic Basins, Plains, and Mountains	1,447,448	67.6
Southern High Plains, Southern Part	81	0.004
Southern High Plains, Southwestern Part	5,771	0.3

The information used to characterize the current conditions within Chaves, Eddy, Lea, and Otero Counties were obtained from 1) NRCS MLRAs descriptions (as included in BLM 2006b) and 2) ecological site descriptions (NRCS 2006b).

Ecological Site Descriptions

Each MLRA is broken down further into Land Resource Units (LRUs). LRUs serve as the basic units for state land resource maps. They typically extend over the same areas as the state general soil map units, but some general soil map units are subdivided into LRUs because of significant geographic differences in climate, water resources, or land use (NRCS 2006b).

The LRUs are broken down further into ecological site descriptions (NRCS 2006b). An ecological site, as defined for rangeland, is a "distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation" (NRCS 2006b).

There are 15 ecological sites within the planning area (Table 3-4). Each ecological site has an ecological site description (ESD), which defines the key characteristics of that site. There is a large number of ESDs within the planning area, which can be found in the NRCS Field Office Technical Guide (NRCS 2012). State and transition models associated with ecological sites specify indicators of ecological resilience and thresholds. Ecological sites are currently being updated to include state and transition models in New Mexico. The BLM uses state and transition models as guides to manage vegetative communities in a manner that would result in a stable or desired state.

Table 3-4. Ecological Sites within Grazing Allotments in the Planning Area

Ecological Sites	BLM Surface	
	Acres	Percent
Bottomland	41,653	2.15%
Breaks	355	0.02%
Deep Sand	398,377	20.56%
Gravelly	26,506	1.37%
Gyp Hills	8,053	0.42%
Gyp Upland	33,245	1.72%
Limestone Hills	468,992	24.20%
Limey	2,049	0.11%
Loamy	274,514	14.17%
Salty Bottom Land	5,834	0.30%
Sand Hills	230,534	11.90%
Sandy	195,002	10.06%
Shallow	161,008	8.31%
Very Shallow	75,770	3.91%
Not assigned	4,912	0.83%

3.2.4.1.2 Monitoring

Three types of quantitative monitoring studies are conducted in the planning area: condition, trend, and utilization. There are approximately 574 active range studies on grazing allotments in the planning area. Rangeland Health Assessments (RHAs) are also performed on grazing allotments within the planning area.

Quantitative vegetation and qualitative RHAs are used in combination to determine rangeland trend within the planning area each fiscal year. The results for the last 5 years are displayed below (Table 3-5). The results for this trend are displayed as a degree of similarity of the current vegetation found to that of the potential climax plant community.

Table 3-5. Rangeland Trend*

Year	Percent Total Acres Inventoried	Potential Natural Community	Late Seral	Mid Seral	Early Seral
2013	98	13	65	21	1
2012	98	12	65	23	0
2011	98	12	58	30	0
2010	98	8	58	34	0
2009	98	5	53	41	0
2008	98	5	50	44	1
2007	98	5	50	44	1
2006	98	4	52	42	2

* Expressed in a degree of similarity of present vegetation to the potential natural, or historic climax, plant community: Potential Natural Community (excellent condition, 76%–100%), Late Seral (51%–75%), Mid Seral (26%–50%), Early Seral (poor condition, 0%–25%)

3.2.4.1.3 Trends

Trend is determined for vegetation in the planning area using a combination of the CFO's quantitative vegetation monitoring and qualitative RHAs, as discussed above. A general overview of these data (see Table 3-5) shows the rangeland health and vegetative makeup to be stable and, in some instances, improving.

The majority of the trend data is for grassland type acreage. While piñon-juniper areas make up approximately 20,000 acres, little trend data is available to determine if piñon-juniper acreage is static, increasing, or decreasing. Even without site specific trend data, many areas of savannah and woodlands

have had fire excluded and now experience high densities of trees. These woodlands have encroached on grasslands, reduced vegetative diversity, and increased erosion potential in many areas. Ecological site descriptions are utilized to assess site conditions and guide vegetation management actions to determine the appropriate mix of vegetation types and abundance. Vegetation management goals for woodland areas would be similar to grassland areas where woody shrubs have encroached on grasslands, thereby reducing diversity. The goals are to restore diversity in vegetation communities within the planning area.

The improving trend in rangeland health within the planning area has been proven to be, in many instances, a direct effect of the Restore New Mexico project. This project includes several types of vegetation manipulation activities that have been administered on a large scale by the CFO since the completion of the 1988 Carlsbad Resource Management Plan (RMP). These vegetation manipulation activities include herbicide application, prescribed fire, and woodland thinning or mastication.

RHAs have been completed on all but 30 of the grazing allotments in the planning area. This leaves 136,674 acres of public lands that have not been assessed. To date, all allotments assessed have met the standards for rangeland health.

3.2.4.1.4 Key Features

Key features for vegetative resources include shinnery oak areas that provide habitat for special status species, such as lesser prairie-chicken (*Tympanuchus pallidicinctus*) and dunes sagebrush lizard (*Sceloporus arenicolus*); Restore New Mexico acreage that has been treated, targeted for treatment, or managed to maintain treatment; areas that support or provide potential habitat for populations of sensitive, threatened, or endangered species, such as Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*) or gypsum wild-buckwheat (*Eriogonum gypsophilum*); and riparian areas that would be managed to protect or improve the unique resources of each system.

3.2.4.2 Riparian Areas and Wetlands

The BLM uses Proper Functioning Condition (PFC), a qualitative method for assessing the condition of riparian areas and wetlands. The assessment process considers hydrology, vegetation, and erosion/deposition attributes of the area and assesses how well the physical processes are functioning. PFC is further described in Riparian Area Management Technical Report 1737-16 1999, Revised 2003, *A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas* (BLM 2003).

3.2.4.2.1 Current Condition

Riparian areas and wetlands support the greatest diversity of plant and animal life of all habitat types. Plants found in riparian areas and wetlands in the planning area are contained in Table S.6, Appendix S. Riparian areas and wetlands are important to a large number of wildlife migrants, as well as to a diverse population of seasonal residents. Most terrestrial animal and insect life depends on riparian or wetland areas as sources of water, forage, and cover. Riparian areas and wetlands comprise less than 1% of the land mass in New Mexico. It has been estimated that 80% of all wildlife in New Mexico spends at least some portion of its life cycle in riparian areas or wetlands. For management purposes, the BLM separate riparian areas and wetlands into those associated with flowing water, lotic, or those associated with non-flowing water, lentic (Table S.7, Appendix S).

Generally, a riparian-wetland area in a physically non-functioning condition does not provide quality habitat conditions. A riparian-wetland area that has recovered to a PFC rating would either be providing quality habitat conditions or would be moving in that direction if recovery is allowed to continue. A riparian-wetland area that is functioning-at-risk would likely lose any habitat that exists in a 25- to 30-year flow event. Table 3-6 displays the PFC for riparian areas and wetlands in the planning area.

Table 3-6. Riparian/Wetland Functioning Condition Status

Habitat Types	Proper Functioning Condition	Functional-at-Risk			Nonfunctional	Unknown	Total
		Trend Up	Trend Not Apparent	Trend Down			
Riparian-Lotic (miles)[A]	15	6.5	21	0	4.625	0	47.125
Wetland-Lentic (acres)	1,025	0	0	0	760	3,057.05	4,842.05

[A] Only BLM-administered miles.

3.2.4.2.2 Trends

In riparian areas, native species, such as cottonwoods and willows (*Salix* sp.), have been significantly encroached on by non-native invaders such as saltcedar (*Tamarix* sp.) and Russian olive (*Elaeagnus angustifolia*). After restoration activities, fragmented stands of cottonwoods or willows are now found on stream banks. Agricultural development, livestock grazing, and flood control have imposed both structures and management resulting in severe disruptions of natural regeneration of the floodplain cottonwood stands. Dams have prevented or limited natural flooding, which has eliminated the sediments and hydrologic regime required for the germination and establishment of the cottonwood and willow species.

Field data from PFC studies compiled throughout the planning area since 1998 indicate that overall trends in riparian and wetland habitats have been improving. Reducing the duration of livestock grazing and changing the emphasis of grazing to cooler season use has resulted in substantial improvements in riparian and wetland condition. Some areas have been excluded from livestock grazing altogether.

The riparian areas associated with the Pecos, Black, and Delaware Rivers have been the focus of a saltcedar eradication program. With the removal of saltcedar, areas that were once inaccessible to cattle are now easily accessible. Excessive grazing and trampling impacts by cattle causes mechanical damage to shrubs and small trees, reduction or elimination of woody seedlings and saplings, exposed soils, and a shift of herbaceous species from native species to weedy or exotic species. Increased accessibility also increased recreation usage, such as equestrian use. When horses and cattle are allowed free access to riparian areas, they can deposit manure on the bank or directly in the water.

3.2.4.2.3 Key Features

Riparian areas along the Delaware and Black Rivers provide keystone habitat for riparian obligate and dependent avian species and provide avian migration stopover sites. Riparian areas contain trees and shrubs that are required for roosting or foraging by most riparian birds. Riparian forests support a greater diversity of wildlife than nearly all non-aquatic areas or upland forests. Animals depend on the vegetation found within riparian areas for food and shelter. The increased humidity of riparian areas makes them important habitat for amphibians, snakes, and turtles.

Fishes in riparian stream areas in the Southwest are intimately linked to the habitat afforded to them. Vegetation rooted at the water's edge provides escape cover, shade, and food for fish. This is especially critical along intermittent streams where remnant summer pools provide refugia for fish.

Riparian areas are crucial to the protection and enhancement of the water resources of the United States. They are extremely complex ecosystems that help provide optimum food and habitat for stream communities, as well as being useful in mitigating or controlling nonpoint source pollution.

3.2.4.3 Noxious Weeds and Invasive Species

Invasive plants disrupt or have the potential to disrupt or alter the natural ecosystem function, composition, or diversity of the sites they occupy. Noxious weeds are native or non-native plants that are unwanted in a particular area at a particular time, as designated by the New Mexico Department of Agriculture (NMDA), pursuant to the Noxious Weed Management Act of 1998. Although noxious weeds are usually non-native, a distinction is made in this document because they can and do include invasive native plants.

Invasive plants are widespread and can cause damage to crops, affect entire industries, and harm the environment and public health. On BLM-administered lands, the degree of impact from invasive plants depends on the growth characteristics of that species, density, size of infestation, land cover type being invaded, resources threatened, potential economic impacts, and cost of control or eradication of the invader.

While no formal inventory of noxious weed or invasive plant populations has been conducted, a continual, casual inventory is the result of reports by field-going BLM personnel. In addition, public land users, such as grazing permittees, oil and gas operators and recreationists often report the location of these populations. Once a population is found, the BLM coordinates with various land users to plan and implement treatment methods to remove or control the population.

3.2.4.3.1 Current Condition

In the planning area, invasive plant infestations begin as small patches in disturbed areas, such as pipeline and utility corridors, roads, oil and gas locations, undeveloped vehicle trails, range improvement projects, and mining operations.

The State of New Mexico places designated invasive plants into following four categories:

- **Class A:** Currently not present in New Mexico or has limited distribution.
- **Class B:** Limited to portions of the state. In areas with severe infestations, management should be designed to contain the infestation and stop any further spread.
- **Class C:** Widespread. Management decisions for these species should be determined at the local level based on feasibility of control and level of infestation.
- **Watch List:** Species of concern with the potential to become problematic. More data are needed to determine if these species should be listed.

Table S.8 in Appendix S lists the State of New Mexico's designated invasive plants declared on the Eddy County designated list. Lea and Chaves Counties use the New Mexico Noxious Weed List (NMDA 2016).

The CFO controls invasive plant species on BLM-administered lands through cooperative agreements with the Chaves, Eddy, and Lea County Coordinated Weed Management Groups. In addition to county agencies, the CFO works in cooperation with other federal and state agencies, private land owners, and energy production companies. The CFO also addresses invasive plant management by incorporating prevention and control measures in realty, wildlife, range, recreation, oil and gas, and other mineral-related actions. In general, county agencies, as well as pesticide use proposals from resource users, have not been able to meet all the weed control needs in the planning area.

The primary species targeted for treatment on BLM-administered lands include African rue, Malta starthistle, Russian olive, and saltcedar. In a few areas, these plants have moved out of the disturbed areas and into the rangelands. The present goal is to contain and reduce densities of invasive species populations to levels that are considered manageable. Table 3-7 lists the invasive plants that have been treated recently in the planning area. Map 3-7 in Appendix B depicts the treatment areas. In some areas, efforts have resulted in substantial control and reduced spread of certain species, such as saltcedar. Other species, especially African rue (*Peganum harmala*) and Malta starthistle (*Centaurea melitensis*), continue to expand their populations, and the number of infested acres is increasing. In addition, one new weed species, Russian knapweed (*Acroptilon repens*), has been reported in a limited area in the southern portion of the planning area.

Table 3-7. Number of Acres Treated for Invasive Plants in the Planning Area

Species	2007	2008	2009	2010	2011	2012	2013
African rue	717	1,462	3,078	989	900	850	711
Malta starthistle	3,293	809	1,106	1,356	800	200	84
Saltcedar	1,200	1,964	932	170	1,986	1,157	1,381
Goldenrod	0	0	0	216	0	0	0

Source: BLM (2007, 2008, 2009, 2010, 2011, 2012, 2013)

3.2.4.3.2 Trends

Observations indicate some invasive plants are spreading or increasing in density in some parts of the planning area, especially in oil and gas fields, interstate corridors, and some watersheds. On average, approximately 5,000 acres of surface disturbance occurs annually due to oil and gas activities within the planning area. Focused efforts, such as Restore New Mexico and regular, routine treatments by oil and gas companies, have limited the spread and reduced the size of invasive plant populations in localized areas.

Two non-native species, the perennial forb African rue and the annual Malta starthistle, have steadily increased, invading nearly every soil type and receiving the bulk of the control treatments. Using currently approved available herbicides and methodologies, control has been achieved where these species have been treated. From 2005 through 2012, treatment to control these two species has been completed on 23,026 acres.

Progress has been made on saltcedar control in most of the planning area. Through an aggressive combined effort, with partners contributing funding, equipment, manpower, or a combination of these, the majority of the once-infested riparian areas were treated. Over the last eight to 10 years, BLM-administered lands along the Pecos, Black, and Delaware Rivers have had nearly all the saltcedar removed. Currently, maintenance treatments to keep these areas free of saltcedar are ongoing. Additionally, many of the drainages that feed these rivers are being treated to control or remove saltcedar. From 2005 through 2012, saltcedar treatment has been completed on 17,682 acres.

3.2.4.3.3 Key Features

Key features for invasive species include areas of known infestations identified on BLM geographic information system (GIS) layers (BLM 2015a), as well as areas of potential infestations including oil and gas facilities and associated developments, riparian zones, and transportation and utility corridors. Invasive and exotic species monitoring would be focused to Special Status Species habitats.

3.2.4.4 Forestry and Woodland Products

The forestry program within the planning area consists of managing limited ponderosa pine stands and extensive piñon-juniper woodlands. Forest management activities employ silvicultural practices and recognize the principles of multiple use. The protection of streams, wildlife, and other forest values is considered in forest management. The forestry program is primarily administered by the fire management program of the CFO and the forestry program from the BLM State Office Program Lead.

3.2.4.4.1 Current Conditions

Forests are important for providing ecosystem services, such as wildlife habitat, forage, watershed requirements, and recreational values. The following factors are used in the assessment of current levels yielded by this resource:

- Number of acres moved into a Fire Regime Condition Class (FRCC). FRCC is described as the degree of departure from historic conditions and falls into one of the three following categories: FRCC 1—generally within historical ranges; FRCC 2—fire regimes on these lands have been moderately altered from their historic range by either increased or decreased fire frequency; and FRCC 3—fire regimes on these lands have been significantly altered from their historic return interval.
- Appropriate mix of seral classes and stand structure for forests and woodlands (percentages of forest and woodlands in early and late seral stages).
- Presence of management actions to restore ecosystem health to forests and woodlands (acres thinned, regenerated, and/or prescribed burned).
- Susceptibility to insect and disease on available forests and woodlands (acres treated and acres at risk).

Restoring the ecosystem requires both the restoration of process and structure. This includes re-establishing the forest understory of herbaceous plants, shrubs, snags, and dead and downed materials. The forest understory is critical for wildlife habitat, tree regeneration patterns, biodiversity, and watershed

function. All of these are critical elements in the ecosystem and in proper soil microorganism functions. Natural disturbance processes, including lightning-caused wildfire, droughts, and insect infestations, are the natural change agents of the forests and woodlands. Fire regimes and stand structure are interrelated. Mechanical treatments alone would not re-establish the natural disturbance regime. In altered stands though, mechanical treatments may be needed as a precursor to re-establishing the pre-suppression structure and process.

Other forecasts relevant to forest and woodland products are found under Section 3.2.7, where the trends in FRCC are discussed in relation to current woodland condition, forecasts are described, and treatment objectives are identified.

Topics that this program would have to address include the following:

- Completing forest/woodland inventories to include possible identification of old growth stands: Current woodland inventories do not exist throughout the planning area).
- Forest health: Stand density index measurements have shown that lack of disturbance in many of the piñon-juniper woodlands is reducing overall forest ecosystem health. Management actions, such as mechanical treatments or prescribed fire, may be used to improve woodland health.

3.2.5 Fish and Wildlife

3.2.5.1 Fish

The BLM is responsible for managing aquatic habitat, while authority for the fish and aquatic life is the responsibility of the New Mexico Department of Game and Fish (NMDGF). The fisheries contained within the planning area are primarily warm water fisheries, although some cold-water species do occur within the planning area. Warm water fisheries support groups of aquatic species that thrive and reproduce in water temperatures warmer than 80 degrees Fahrenheit (°F). The preferred temperature range for these fishes is between 70°F and 85°F.

3.2.5.1.1 Aquatic Macroinvertebrates

Invertebrates are useful for assessing and monitoring riparian and stream health because they are closely linked to the biotic and abiotic characteristics of their habitat. The rapid generation time and small home range of many invertebrates makes them ideal for biomonitoring. EPT is a summary of the taxonomic richness and abundance within the insect Orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These orders are commonly considered sensitive to pollution. The Texas hornshell (*Popenaias popeii*) is a member of the Mollusca phylum and has been used as an indicator species to assess and monitor riparian and stream health.

3.2.5.1.2 Current Condition

Stream habitat conditions are closely tied to riparian conditions and water quality. Riparian vegetation moderates water temperatures, increases bank stability, supports insects used as important food source, filters sediment, provides stream habitat for fish, and provides organic material for aquatic insects. Indicators of the health of fish populations and their habitat are population numbers, water quality and quantity, bank cover, insect populations, habitat quality, habitat gains or losses, and listing as threatened or endangered or BLM special status species.

The habitat requirements for fish include a healthy, functioning aquatic ecosystem consisting of essential components of an aquatic community, as well as the proper physical and chemical attributes. The aquatic community consists of three main components:

- Aquatic plants (phytoplankton, periphyton, and rooted vascular macrophytes)
- Bacteria and fungi
- Consumers (invertebrates and fish, birds, mammals, amphibians)

Physical and chemical attributes influencing fish abundance include water quality, water temperature, stream flow, water velocity, cover, substrate, energy flow and stream productivity, and riparian vegetation.

Fish are typically classified as game or non-game, as well as native and non-native species.
The NMDGF identifies approximately 41.5 miles of river habitat on BLM-administered lands that could support fish. In addition, the CFO manages an estimated 540 surface acres of springs and seeps. Fish species utilizing aquatic habitats include, but are not limited to, the many families and/or species.

There also may be other fish present as a result of “bait-bucket” introductions. This is a result of unused bait released live into the water or on shore. The introduction of non-native animals resulting from their release as bait has been documented throughout the nation. Although most of these introductions were inadvertent, many have caused unexpected damage. Bait bucket introductions of non-native aquatic species, especially exotic fishes and crayfishes, have contributed to the loss of important habitats, changes in aquatic food webs, loss of native species, and the spread of pathogens. Non-native introductions include, but are not limited to, the following families and/or species: Atherinidae (inland silverside [*Menidia beryllina*]) and Moronidae (white bass [*Morone chrysops*])

Fish inhabiting systems that contain permanent flowing or standing water may not show much in the way of specialized adaptations to desert environments because the physical and chemical conditions of these large water masses are stable and well within the normal limits of fish tolerances. On the other hand, springs or small ponds may be subject to extreme daily and seasonal fluctuations of dissolved oxygen, temperature, and salinity. Under such conditions, specialized adaptations are required to ensure the survival of the fish population. Desert fishes must endure low quantities of dissolved oxygen and high temperatures.

Pecos River Habitat

The Pecos River runs from north to south through the resource area, covering approximately 105 miles. Of the 105 miles, the BLM manages approximately 29 miles: 4 miles north (including a portion of Avalon Lake) and 25 miles south of Carlsbad. Several dams exist on this river within Eddy County, including Brantley, Avalon, and Six-Mile, which are primarily used for irrigation. Second to irrigation and water rights, recreation and wildlife and fisheries habitat are important values of the river system. Downstream from Malaga Bend, there exists a geologic structure known as the salt dome. At this point in the river, the downstream water course experiences an increase in salinity. As a result, native vegetation re-establishment efforts are ineffective. Information about the riparian health of the Pecos River can be found in Section 3.2.4.2 Riparian Areas and Wetlands.

An emerging problem on the Pecos River is the impact from golden algal blooms caused by *Prymnesium parvum*, a species that thrives in brackish water. Fish kills caused by golden algae may last for days, weeks, or months and can change locations daily. Affected locations within a river or reservoir may change rapidly; sometimes only a portion of the reservoir or river is affected. All species of fishes may be affected, as well as freshwater mollusks, crayfish, gilled amphibians, such as tadpoles, and certain plankton species.

Black River Habitat

Upper Black River consists of several spring-fed pools. The river is characterized by a series of deep, elongated pools interconnected by a shallow, narrow stream with a perennial surface flow in normal years. The tract is divided approximately in half by a concrete dam built in the 1920s. The dam and irrigation facilities are non-operational for off-site use of the water. Deciduous trees and shrubs dominate the riparian zone. Shrubs dominate most of the adjacent lands, including the gypsum-influenced zones, and open grasslands prevail on some of the upland flats and in some segments of the riparian zone.

Lower Black River has two perennial spring-fed tributaries: Blue Spring Creek and Castle Spring Creek. Blue Spring is the major discharge point of groundwater in the Black River Basin. Blue Spring Creek traverses approximately 5 miles before entering the Black River. The lower half of Blue Spring Creek is periodically dry when spring flow is diverted for irrigation. Castle Spring Creek, originating in Black River Village, is lowest in elevation of the major springs. Black River drains into the Pecos River approximately 1.2 miles northeast of the town of Malaga. Information on the riparian health of the Black River can be found in Section 3.2.4.2 Riparian Areas and Wetlands.

Delaware River Habitat

The Delaware River is located south of the Black River near the border with Texas. The river is fed by a series of lesser drainages originating from the limestone foothills of the Guadalupe Escarpment in Texas and empties into the Pecos River. The river is usually narrow and slow moving with an average flow rate of 3.1 cubic feet per second (cfs) at its mouth. The Delaware River shows the attributes of a degraded system that suffered from major disturbances resulting in bank erosion and riverbed degradation. Restoration of the Delaware River in New Mexico began in the 1990s. Restorations efforts have focused on removing invasive vegetation, including saltcedar, and planting native riverine flora. Currently, the entire river course has undergone restoration efforts. The effects of the restoration activities have included an increase of availability of water for native flora. Restoration efforts have also decreased water salinity and sedimentation in the river. In addition, the river is several feet below the historical river bank. The current floodplain is a narrow strip several yards wide through most of the river course. Effects of livestock use are apparent. Information on the riparian health of the Delaware River can be found in Section 3.2.4.2 Riparian Areas and Wetlands.

3.2.5.1.3 Trends

According to reports from other states and recent trends in New Mexico, most fish kills caused by golden algae occur during the winter and spring months. This is the time of year when environmental conditions, such as cooler temperatures and limited nutrients, are not favorable to other algae, and it appears to give golden algae an advantage. However, the exact environmental conditions favoring toxic algal blooms are not clear, and even though factors such as water temperature and salinity are somewhat helpful in predicting future blooms, there are many exceptions that have been reported.

3.2.5.2 Wildlife

The BLM wildlife program is responsible for the management of wildlife habitat on BLM-administered land to ensure wildlife populations are sustainable for future generations. Management of wildlife populations is the responsibility of the NMDGF. The lead for management of migratory and federally listed threatened, endangered, and proposed species is the U.S. Fish and Wildlife Service (USFWS). Species that are considered special status species by the BLM or threatened or endangered species by the USFWS are discussed in the Special Status Species section (see Section 3.2.6).

The CFO manages land for the conservation and rehabilitation of fish, wildlife, and plant resources consistent with multiple-use management principles. Wildlife habitat within the planning area is affected by numerous variables, including water availability, vegetation, topography, and human development. The latter would contribute to habitat degradation and fragmentation. Limited wildlife surveys have been conducted and, therefore, population trends in response to other variables may be difficult to determine.

3.2.5.2.1 Current Condition

Wildlife Indicators

Relevant wildlife indicators include the following:

- **Habitat quality:** Habitat is monitored using the Rangeland Health Assessment and Robel surveys. The Robel value often is used as a measure of intensity of grazing by livestock, with lower values indicating high usage, and the technique is recommended for evaluation of habitat of lesser prairie-chickens (Mote et al. 1999). The device used to obtain Robel values is a pole (Robel pole) marked in 1-inch increments with a pointed rod at one end that could be pushed into the soil. To begin each transect, 10 steps are taken from a central point of origin. The pointed end of the Robel pole is shoved into the ground at the place where the toe of the boot is positioned on the tenth step. Four readings of the Robel pole are taken in a circle around the pole. The readings are taken from a distance of 4 meters (158 inches) and a height of 1 meter (39 inches); distances are measured by a rope attached to the pole. The four readings are averaged to give a value for each point; the procedure is repeated 25 times and values are averaged to give a value for each transect. The results can be compared to the agency objectives for residual vegetation criteria.

- **Loss or gain of habitat:** Approximately 83% of public land managed by the CFO is open to oil and gas exploration. During Fiscal Years 2009–2011, approximately 2,000 oil/gas locations were approved. Additional infrastructure supporting exploration consists of access roads, overhead power lines, surface flow lines, compressor stations, and hydraulic fracturing ponds. Oil and gas development contributes to loss of habitat and fragmentation of the landscape. An ongoing restoration effort under the Restore New Mexico program attempts to re-establish the quality of disturbed habitat.
- **Wildlife surveys:** Presence-absence surveys are used to monitor changes in wildlife distributions.

Many wildlife species within the planning area have experienced declines or fluctuations in populations due to human-induced habitat degradation and fragmentation. This type of habitat loss can largely be attributed to livestock grazing, fire suppression, oil and gas development, and other development. Changes in habitat from natural alterations related to drought, fire, and flooding also induce fluctuations in wildlife populations. Encroachment of invasive species can degrade natural communities to reduce support for native wildlife. Invasions can be exacerbated by human-induced habitat modifications, natural changes (climate change, drought), or suppression of natural processes (fire).

The CFO is currently using two funding programs to restore or improve wildlife habitat. Restore New Mexico was initiated in 2005 as a partnership to restore the health and productivity of the state's grasslands and riparian areas and prevent listing of candidate species. The program is intended to improve wildlife habitat by restoring the health and biological diversity of the land impacted by energy development, remove invasive species such as saltcedar from waterways, increase biodiversity of riparian areas, and reintroduce fire to the landscape. These goals are being accomplished by aerial herbicide treatments of invasive brush species, prescribed fire, and reclamation of oil fields. Approximately 615,000 acres have been restored within the planning area in an effort to reconnect the landscape.

The BLM, in cooperation with Southeastern New Mexico Wildlife, Inc., has used Sikes Act funding to create 174 water catchment units designed to store precipitation and provide supplementary water for wildlife. Most of the watering units have a 1-acre exclosure to prevent livestock from accessing the unit. Southeastern New Mexico Wildlife, Inc., is also responsible for 16 other habitat improvement projects within the planning area consisting primarily of fencing exclosures to keep livestock away from sensitive areas (e.g., playas and ground-nesting sites).

Game Species

Game species consist of big game, small game, upland birds, migratory waterfowl, and protected furbearers. The NMDGF collects and compiles considerable data regarding game population levels and habitat, as these species populations are monitored to track their supportable harvest.

Big Game

Big game species within the planning area consist of mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), elk (*Cervus canadensis*), collared peccary (*Pecari tajacu*), wild turkey (*Meleagris gallopavo*), cougars (also called mountain lions [*Puma concolor]*), and Barbary sheep (also called Aoudad [*Ammotragus lervia*]). Established population size objectives guide management strategies for each big game herd unit. These objectives are established by the NMDGF.

Mule deer occur throughout the entire planning area in all habitat types. They can be found in the Chihuahuan desert scrub, semi-desert grassland, shinnery oak sand dune complex, and riparian areas. Cover, food, and water are the core elements of mule deer habitat and many individuals will utilize more than one habitat type, or where habitat types are interspersed, to obtain life requirements. Deer are primarily browsers, with a majority of their diet comprising forbs and browse (e.g., leaves, twigs, and woody shrubs). However, succulent vegetation is very important for lactating females.

Pronghorn are commonly found in association with grasslands and sagebrush communities. Within the planning area they can be found in the semi-desert grassland, shinnery oak sand dunes, and occasionally in the Chihuahuan desert scrub habitat types. Habitats appear to be selected based on availability of adequate forage, cover, water, and visibility. Pronghorn diets are composed largely of various species of browse, forbs, and cacti throughout most of the year. Grasses may only be an important food source during

the spring when new growth provides high protein content. Distance from water from pronghorn ranges during the summer and fall usually do not exceed 5 miles, while pronghorn kidding sites usually do not exceed a distance of 2 miles from a reliable water source.

Elk are not very abundant in the planning area, but they can be found in the south Guadalupe Escarpment area and to the south of Dunken, New Mexico. Elk spend the summer months in higher elevation habitat consisting of mountain meadows and mixed coniferous forests. These habitat types are occupied by elk in the adjacent Lincoln National Forest and Guadalupe Mountains National Park. In winter, elk move to lower elevation habitat consisting of shrub/grass mixtures and piñon-juniper woodlands. The south Guadalupe Escarpment area consists of Chihuahuan desert scrub interspersed with juniper. Some of the elk from the surrounding areas utilize this area primarily as wintering grounds. The area south of Dunken consists of foothill terrain with a larger juniper woodland component than the Guadalupe Escarpment.

Collared peccaries, also commonly known as javelina, are found throughout the planning area in every habitat type. They are known to occupy the Chihuahuan desert scrub, mesquite grasslands, shinnery oak sand dune complexes, and riparian areas. Peccaries commonly utilize habitat along dry washes or arroyos that contain dense thickets of prickly pear (*Opuntia* sp.), mesquite, and other Chihuahuan desert scrub. These thickets provide a vital source of food, moisture, and a place to bed down during the midday sun. The crevices and channels of the arroyos provide retreats from predators. Peccaries are mostly herbivorous and feed heavily on prickly pear, mesquite beans, sotol, and lechuguilla (*Agave lechuguilla*). They often push around sandy surface soils to expose chunks of roots and cacti.

Wild turkeys occupy the riparian areas along both the Black and Delaware Rivers. They inhabit the brushy areas along streams and rivers and utilize this habitat as a source of food and cover. Large trees used as roosting sites during the winter months, but wild turkeys will also use human-made structures, such as bridges. Turkeys are omnivorous, feeding on both vegetation and insects. Nuts, berries, and other annual mast serve as a major food source for wild turkey. Green vegetation, such as grasses and young forbs, are an important food source when available during the spring months. The diet of juvenile turkey consists almost entirely of insects for the first few months of their lives. Habitat quality for these species is very much dependent on precipitation.

Cougars, or mountain lions, occur in most parts of New Mexico and are usually found in areas of high relief where prey is abundant. They are highly dependent on deer but will also prey on rabbits, bighorn sheep, elk, raccoons, turkeys, and, sometimes, domestic animals. In the planning area, the best cougar habitat occurs in the Guadalupe Escarpment; the open, eastern plains are low-quality habitat. Individual lions range in areas from 10 to more than 300 square miles, depending on the food availability, terrain, and whether the cougar is male or female. The NMDGF manages to increase cougar populations throughout the planning area.

Barbary sheep are relatively abundant in the southeast part of New Mexico and are found in the rugged Guadalupe Mountain area, as well as in the rolling hills in most of southeastern New Mexico where Chihuahuan Desert vegetation dominates. These exotic mammals were brought to New Mexico from North Africa by a rancher in Hondo, New Mexico (roughly 90 miles northwest of Carlsbad), where they escaped in 1943. The Barbary sheep were well adapted to the habitat in the deserts of New Mexico, and in 1950, the NMDGF began releasing the sheep for hunting opportunities in other areas of New Mexico. Mating mostly occurs from September to November but is known to occur year-round. These ungulates are mostly browsers, with mountain mahogany (*Cercocarpus breviflorus*) and wavyleaf oak (*Quercus undulata*) comprising a large percentage of their diet, according to a study conducted in New Mexico (Johnston 1979).

Small Game

Small game includes mammals such as squirrels, and upland game birds. Scaled quail (*Callipepla squamata*) are the most numerous of the upland game birds, but northern bobwhite quail (*Colinus virginianus*) are also present in some areas, and Montezuma quail (*Cyrtonyx montezumae*) have also been reported. Scaled quail can be found in numerous habitat types throughout the planning area, while bobwhites have only been observed utilizing the habitat directly related to the shinnery oak sand dune complexes. The few Montezuma quail observations have been restricted to the higher elevation piñon-juniper habitat type. Other upland game bird species that occur in the planning area include Eurasian collared-dove (*Streptopelia decaocto*), mourning dove (*Zenaida macroura*), and white-winged dove (*Zenaida asiatica*).

Scaled quail are primarily limited to the Chihuahuan desert and the adjacent semi-desert grasslands, but they can also occupy habitat within the desert transitional scrub zone and shinnery oak sand dunes. Preferable habitat contains a combination of annual weeds, shrub, and/or cactus ground cover, and available surface water. Brush is utilized as a source of food, cover, and shade, but extremely dense brush is avoided as it may prevent escape by running. Scaled quail are largely herbivorous and feed heavily on the seeds of various weeds, grasses, and shrubs. Insects can make up a large portion of the quail's diet when they are available. Habitat quality for these species is very much dependent on precipitation.

Furbearers

The NMDGF considers numerous species within the planning area as protected furbearer species. These species may be harvested with a permit during their respective open season. Protected furbearers consist of raccoon (*Procyon lotor*), badger (*Taxidea taxus*), long-tailed weasel (*Mustela frenata*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), ringtail (*Bassariscus astutus*), and bobcat (*Lynx rufus*). These animals occupy a large variety of habitats throughout the planning area, many of them utilizing more than one habitat type. Habitat quality for these species is very much dependent on precipitation. Unprotected furbearers include coyote (*Canis latrans*) and striped skunk (*Mephitis mephitis*).

Waterfowl

Although the planning area may not contain important breeding or nesting ground for waterfowl, it is located within the Central Flyway. The open surface water of the Pecos River, its reservoirs, and other water bodies provide important resting areas during migration for a variety of waterfowl species. These include, but are not limited to, ruddy duck (*Oxyura jamaicensis*), canvasback (*Aythya valisineria*), mallard (*Anas platyrhynchos*), northern shoveler (*A. clypeata*), American wigeon (*A. americana*), and Canada goose (*Branta canadensis*). Agricultural fields also provide waterfowl with important foraging habitat to restore energy during the long migration.

Non-Game Species

Non-game species include raptors, neotropical migrants, reptiles, amphibians, and mammals not discussed above. Such species are numerous and diverse and occupy the entire range of habitats present in the planning area. Habitat quality for non-game species is also dependent on precipitation. Limited wildlife surveys have been conducted for non-game species and therefore little is known about their distribution or population status. Non-game species groups are addressed below. Sensitive non-game species are addressed in Section 3.2.6.4.

Raptors

Raptor species, also referred to as birds of prey (i.e., eagles, hawks, owls, and falcons) that could occur in the planning area include golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*B. jamaicensis*), rough-legged hawk (*B. lagopus*), Harris's hawk (*Parabuteo unicinctus*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), barn owl (*Tyto alba*), western burrowing owl (*Athene cunicularia hypugaea*), great horned owl (*Bubo virginianus*), western screech owl (*Otus kennicotti*), American kestrel (*Falco sparverius*), prairie falcon (*F. mexicanus*), peregrine falcon (*F. peregrinus*), and aplomado falcon (*F. femoralis*). Raptors are sensitive to environmental disturbance and occupy an ecological position at the top of the food chain, acting as biological indicators of environmental quality. Raptors are found throughout the planning area.

Most raptor species have specific nest site requirements, which are key factors in site selection and reproductive success. These factors include suitable nesting structure, available prey base, and lack of nest site disturbance for some species or individual birds. Nests can occur in a myriad of habitats, including steep cliffs and rock ledges, large karst features, trees and shrubs, and below the ground (western burrowing owls). Individual raptors, tolerant of human activity, may nest on artificial structures, utility poles, and tanks, or in other human-made dwellings (barn owl). The breeding season is considered the most critical period in the raptor life-cycle since it influences productivity long-term population viability.

Raptors in the planning area generally build their nests in trees, large brushes, or along steep escarpments, returning to the same location every year, and in some species using the same nest (golden eagle). Most species utilize trees (e.g., cottonwood, hackberry, soapberry [*Sapindus* sp.]), large brushes (e.g., mesquite, catclaw), and larger cacti (e.g., cane cholla [*Cylindropuntia imbricata*], soaptree yucca [*Yucca elata*]) as nesting strata. Some species, such as golden eagle and great horned owl build their nests on steep cliffs or rock ledges. Smaller raptors, such as American kestrel require tree cavities. Western burrowing owls utilize small dens in the ground previously created and abandoned by small burrowing mammals such as ground squirrel or prairie dog.

Raptors, along with most other bird species, are protected by the Migratory Bird Treaty Act (16 USC 701, et seq.) of 1918 (MBTA). The MBTA implements various treaties and conventions between the United States, Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the MBTA, unless permitted by regulations, it is unlawful to 1) pursue, hunt, take, capture, or kill; 2) attempt to take, capture or kill; and 3) possess, offer to or sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. USFWS regulations broadly define “take” under the MBTA to mean “pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

Eagles are further protected by the Bald and Golden Eagle Protection Act (16 USC 668–668c) of 1940 (BGEPA), which prohibits anyone without a permit issued by the Secretary of the Interior from “taking” eagles, including their parts, nests, or eggs. The BGEPA provides criminal penalties for persons who “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle . . . [or any golden eagle], alive or dead, or any part, nest, or egg thereof.” The BGEPA defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.” For purposes of this document, “disturb” means to agitate or bother a bald or golden eagle to a degree that causes or is likely to cause based on the best scientific information available, 1) injury to an eagle; 2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle’s return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

Certain parts of the planning area contain escarpments that create diverse ecotones for many wildlife species, particularly raptors. This habitat is protected because it provides nesting sites for birds of prey.

Migratory Birds

Neotropical migrants include shorebirds, water birds, and songbirds that are found throughout the planning area in every vegetation community type. The highest diversity of migratory birds is found in the riparian and wetland communities. These birds are also covered by the MBTA (see above).

Riverine systems, springs, and their associated riparian areas are protected in the planning area due to their importance to avian species for nesting and as migratory stopover habitat. Riparian areas contain trees and shrubs that are required for roosting or foraging by most riparian birds. Riparian areas also support populations of amphibians and reptiles and serve as critical corridors for the movement of wildlife across the landscape.

The protection of established heronries and associated feeding areas such as the historic Phantom Banks site is critical to ensure the stability of breeding populations of herons and egrets (Family: Ardeidae). Herons are especially vulnerable to human disturbance and habitat degradation during the breeding season when large numbers of nesting birds are concentrated in a confined area. The 1997 Resource Management Plan Amendment (RMPA) specifically prevents disturbance to these sites by not allowing surface disturbance within 656 feet of active heronries, by delaying activity for up to 120 days, or a combination of both. An area approximately 0.25 mile in circumference around an active heronry would be closed to mineral material disposal.

Operators are also required to evaluate avian use of project areas and design projects to minimize or mitigate the potential impact on birds.

Non-Game Mammals

Non-game mammals occurring within the planning area include desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), ground squirrels, mice, rats, shrews, and bats.

Large mammalian predators such as coyotes have large home ranges and may be found in all habitat types occurring in the planning area. Other keystone species include black-tailed prairie dogs (*Cynomys ludovicianus ludovicianus*), which serve as prey for avian and mammalian predators. Prairie dog colonies also provide critical habitat for western burrowing owls and a number of reptiles. The 1997 RMPA specifically prevents surface disturbance within known prairie dog colonies.

Bats

Seventeen bat species are known to occur in the CFO. The planning area contains a very large concentration of limestone caves, many of which serve as important roosting and nursery habitat for several species of bats. In New Mexico, bats are the primary predators of night-flying insects. Throughout New Mexico, bats are on the decline, often due to habitat destruction, pesticides, and obliteration of colonies by vandals. The following non-status bats are found within the planning area: big brown bat (*Eptesicus fuscus pallidus*), California myotis bat (*Myotis californicus*), western small-footed myotis bat (*M. ciliolabrum melanorhinus*), Mexican free-tailed bat (*Tadarida brasiliensis*), pocketed free-tailed bat (*Nyctinomops femorosaccus*), hoary bat (*Lasiurus cinereus*), eastern red bat (*L. borealis*), pallid bat (*Antrozous pallidus*), and canyon bat (*Parastrellus hesperus*). The 1997 RMPA requires operators to evaluate bat use of project areas and design projects to minimize or mitigate the potential impact on bats.

Reptiles and Amphibians

There are numerous species of reptiles and amphibians that occur within the planning area. Some of these species include western diamondback rattlesnake (*Crotalus atrox*), coachwhip (*Masticophis flagellum*), desert kingsnake (*Lampropeltis getula*), bull snake (*Pituophis melanoleucus*), Texas horned lizard (*Phrynosoma cornutum*), side-blotched lizard (*Uta stansburiana*), checkered whiptail (*Cnemidophorus grahamii*), collared lizard (*Crotaphytus collaris*), ornate box turtle (*Terrapene ornata*), plains leopard frog (*Rana blairi*), Great Plains toad (*Bufo cognatus*), New Mexico spadefoot (*Spea multiplicata*), Couch's spadefoot (*Scaphiopus couchii*), and tiger salamander (*Ambystoma tigrinum*). There are no estimates of population size available, and little is known about the distribution of these species within the planning area.

Pollinators

Pollinator species are animals, primarily insects, that move pollen from male structures of flowers to the female structure of the same plant species, thus fertilizing the plant, which results in the formation of seeds and the fruit that surrounds the seeds. Other pollinators include some avian species and bats. Insect pollinator species are numerous and diverse and occupy the entire range of habitats where flowering plants are present in the planning area. Habitat quality for pollinator species is also dependent on plant species present and precipitation. Monarch butterflies and bees are addressed below.

Monarch Butterflies

The monarch butterfly (*Danaus plexippus*) is the only butterfly in North America that migrates annually. The USFWS received a petition to list the monarch butterfly under the Endangered Species Act of 1973 (ESA) on August 26, 2014. The USFWS is currently conducting a species status assessment and status review to determine if the monarch butterfly warrants listing under the ESA.

Monarch butterflies occur throughout New Mexico during the warm season (April–September) and are thought to be most abundant in the southeastern portion of the state. It is not known if monarch butterflies overwinter anywhere in New Mexico. Monarchs use milkweed species (*Asclepias* spp.) as host plants for their eggs. In recent years there have been escalating conservation concerns regarding declines in the numbers of monarchs, their host milkweeds, increased pesticide use, and habitat loss.

Bees

The European honey bee (*Apis mellifera*) and wild native bees pollinate the majority of the fruits and vegetables that are grown in the United States. Research indicates that when honey bee populations decline, native bees often fill the pollination gap. In addition to morphological differences, bees native to New Mexico differ from the non-native honey bees in that they are typically solitary species that nest alone or form small colonies and native bees prefer varying nesting sites. There are six major native bee families and more than 4,000 species of native bees in the United States. Representative species from most of the six major families are found in New Mexico, including the Andrenidae family (miner bees); Apidae family, which is divided into three subfamilies and includes bumble bees, squash bees, digger bees, long-horned bees, cuckoo bees, carpenter bees, and mallow, sunflower, or cactus bees; Colletidae family (yellow-faced bees and plaster bees); Halictidae family (sweat bees); and Megachilidae family (leaf-cutter, mason, carder, and blue orchard bees).

3.2.5.2.2 Trends

The diversity and abundance of wildlife within a given area is directly related to maintaining habitat diversity, availability, and quality. Many wildlife species within the planning area have experienced declines or fluctuations in population due to human-induced habitat degradation and fragmentation. This type of habitat loss can largely be contributed to livestock grazing, fire suppression, oil and gas development, and other human development. However, current habitat management and restoration programs are working towards increasing the amount of available quality habitat and decreasing the detrimental effects to habitat caused by anthropogenic effects. Naturally occurring phenomena such as drought, fire, and floods also play a large role in the fluctuations in population of numerous wildlife species. These phenomena can deplete critical elements from the habitat such as forage and cover availability and can be detrimental to the local population if they occur during nesting or birthing. Similarly, predatory animal populations are affected by the fluctuations of their prey base populations.

3.2.5.2.3 Key Features

Limestone and Gypsum Caves

The planning area contains a very large concentration of limestone and gypsum caves. Many of these caves serve as important roosting and nursery habitat for several different species of bats. The management and protection of these caves is imperative in the protection and conservation of these bat species within the planning area.

Sand Shinnery Oak Communities

Sand shinnery communities comprise the nation's largest stand of oak and occupy 5 to 7 million acres of the southern Great Plains, extending from northern Texas and western Oklahoma southward into Chihuahuan Desert scrubland. The stand is made up of ancient plants, most of them hundreds or thousands of years old. This oak forest is only 1 to 4 feet tall. The visible shrubs are mostly the short-lived twigs of massive underground stem systems, which slowly spread under areas up to 2 acres or more. The oaks co-dominate the community with mid and tall grasses that are usually taller than themselves. Sand shinnery is defined by shin-oak, also called Havard oak, midget oak, and sand shinnery oak. Shin and shinnery are Louisiana French from chêne and chênière, which mean oak and oak woodland. Other shinneries cover millions of acres from Louisiana to central Texas and Oklahoma, but they are dominated by oak species that are small trees, rather than co-dominated by oak-shrubs and grasses as is sand shinnery.

Riparian Areas

Riparian areas and their associated river systems and springs provide keystone habitat for riparian obligate and dependent avian species. Riparian areas provide avian migration stopover sites. Long-distance migration requires exceptional energy reserves, and migratory birds must rest and replenish fat reserves while traveling between wintering and breeding areas. Riparian areas contain trees and shrubs that are required for roosting or foraging by most riparian birds. Riparian forests support a greater diversity of wildlife than nearly all non-aquatic areas or upland forests. Mammals depend on the vegetation found within riparian areas for food and shelter. The increased humidity of riparian areas makes them important habitat for amphibians, snakes, turtles, and pollinators.

Riparian areas are crucial to the protection and enhancement of the water resources of the United States. They are extremely complex ecosystems that help provide optimum food and habitat for stream communities, as well as being useful in mitigating or controlling nonpoint source pollution.

Escarpment Faces

Particular areas of the planning area have an increased richness of escarpments. This habitat feature provides birds of prey ideal nesting sites. Raptors have perfected the art of soaring to reduce the amount of energy they expend during their search for food on the fly. For example, air currents rising up the side of a canyon walls and escarpment faces create updrafts that birds can ride for extra altitude. The technique is called ridge lift or slope soaring. Raptors and other birds also use two common techniques known as thermal soaring and dynamic soaring. The escarpment faces and canyon walls provide the structure for the previous mentioned activity.

Heronries

Well established heronries such as the Phantom Banks Heronries may be occupied for decades or even centuries due to the habitat conditions that are favorable for reproductive success (Bent 1963). The protection of established heronries and associated feeding areas is critical to ensure the stability of breeding populations of herons and egrets (Family*:* Ardeidae). Herons are especially vulnerable to human disturbance and habitat degradation during the breeding season when large numbers of birds are concentrated in a moderately confined area.

3.2.6 Special Status Species

The CFO Special Status Species Program focuses on protecting special status species, as well as protecting and enhancing the habitats of threatened, endangered, and other special status species to ensure their continued existence. BLM special status species are:

- Species listed or proposed for listing under the Endangered Species Act of 1973 (ESA). The ESA provides for the conservation of threatened and endangered plants and animals, implemented by the USFWS and the U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries Service. The USFWS maintains a worldwide list of endangered species. Species include birds, insects, fish, reptiles, mammals, crustaceans, plants, grasses, and trees (see Appendix Q).
- Species designated as sensitive by the BLM State Director that require special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. All federal candidate species, proposed species, and species delisted for 5 years or less are considered BLM sensitive species (see Appendix Q).

According to the ESA, an endangered species is any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Species proposed for listing as threatened or endangered are managed with the same level of protection as listed species. BLM policy for candidate species is contained in BLM Manual 6840. The BLM carries out management consistent with the principles of multiple-use for the conservation of special status species and candidate species and their habitat. The BLM must ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered, and that BLM actions would not adversely affect the likelihood of recovery of any threatened or endangered species (BLM Manual 6840.06). Protection and management of all special status species would continue to be a high priority and coordinated with other programs and activities as needed to meet management objectives.

The ESA was established to protect and recover imperiled species and the ecosystems upon which they depend. As such, numerous species and habitats are protected as threatened or endangered by the ESA. Section 7(a)(1) of the ESA requires every federal agency, in consultation with and with the assistance of the Secretary of the Interior, to ensure that any action it authorizes, funds, or carries out in the United States or upon the high seas is not likely to jeopardize the continued existence of any listed species or to result in the destruction or adverse modification of critical habitat.

Collaborative conservation activity plans would be written for any federally listed species not presently covered by a recovery plan. Specific objectives and actions stated in the recovery plans would be incorporated upon their revision. A species would be added to the list if it is determined to be endangered or threatened due to any of the following factors: the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; and other natural or human-induced factors.

3.2.6.1 Indicators

The BLM is mandated to carry out management consistent with the principles of multiple use, for the conservation of special status species and their habitats, and shall ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered (BLM Manual 6840.06).

Some important habitat features are vertical and horizontal structure, moisture, sunlight, and temperature. If only one of these conditions is inappropriate, a species may not be able to survive. Some species are dependent on more than one habitat type and need a variety of habitats near each other to survive. It must be emphasized that habitat does not have to be completely eliminated to lose its usefulness to an organism. Acres of available habitat can be used to quantify impacts to special status species.

The following section describes the vegetation communities habitat cover types that are associated with all special status plant and wildlife species within the planning area.

3.2.6.1.1 Vegetation Communities Habitat Cover Types

Sand Shinnery Oak (approximately 1,086,895 acres)

Sand shinnery communities comprise the nation's largest stand of oak. The stand is made up of ancient plants, most of them hundreds or thousands of years old. Sand shinnery is defined by shinnery oak, also called Havard oak, midget oak, and sand shinnery oak. Sand shinnery communities extend across the southern Great Plains occupying sandy soils in portions of Eddy, Lea, and Chaves Counties. The characteristic feature of these communities is co-dominance by shinnery oak and various species of grasses. Currently the shinnery oak communities are healthy; however, there are areas experiencing mesquite encroachment.

Chihuahuan Desert (approximately 617,400 acres)

A high mid-continental plateau, the Chihuahuan Desert extends from southeastern Arizona and southern New Mexico through west Texas and into Mexico. In New Mexico, Chaves and Eddy Counties, west of the Pecos River, consist largely or entirely of Chihuahuan Desert habitat type. The indicator plant species is lechuguilla. Most of the precipitation is received in the form of summer monsoonal storms that nourish plant species such as ocotillos, agaves, and yuccas. Areas throughout the planning area are experiencing an increased component of catclaw, which may decrease the fire adaptability of this ecosystem. Catclaw potentially decrease the fine fuel component (grasses), thereby reducing ability to use wildland fire.

Transitional Scrub Zone (approximately 32,561 acres)

There is a transition zone separating the Chihuahuan Desert (west) from the sand shinnery community (east) habitat type. This habitat is primarily dominated by mesquite scrublands intermixed with various grasses. This mesquite scrubland community extends across the southern Great Plains, occupying portions of north and west Texas, western Oklahoma, and southeast New Mexico. Portions of Eddy and Lea Counties consist of mesquite scrublands to a lesser degree. The characteristic feature of the mesquite scrubland community is co-dominance by various species of grasses and cacti.

Riparian (approximately 4,500 acres)

Riparian areas are located adjacent to rivers, creeks, lakes, springs, and wetlands. They are a transition zone between the upland and aquatic ecosystems. Both riparian areas and wetlands are composed of aquatic vegetation with unique soil characteristics that developed under the influence of perennial water. The riparian areas throughout the planning area have undergone extensive saltcedar removal and restoration efforts are ongoing.

Piñon-Juniper (approximately 294,824 acres)

The three major tree species found in New Mexico within the piñon-juniper woodland are piñon, oneseed juniper (*Juniperus monosperma*), and alligator juniper (*Juniperus deppeana*) (Lanner 1975, 1981; Little 1950; Pieper 1977; Springfield 1976). Piñon-juniper vegetation form a mosaic pattern with trees interspersed with open grassland areas between the trees. Several oak species (*Quercus arizonica*, *Quercus grisea*, *Quercus emoryi*, and *Quercus oblongifolia*) are important understory shrubs. Mountain mahogany (*Cercocarpus montanus*) and Wright's silk tassel (*Garrya wrightii*) are also important browse species in this habitat cover type (Boeker et al. 1972; Short et al. 1977).

3.2.6.2 Special Status Plants

3.2.6.2.1 Current Condition

The planning area for special status plants has two interpretations depending on Federal or BLM listing status. For plant species on the federal list of endangered and threatened plants, the planning area includes all lands in public surface and mineral ownership within the Carlsbad Resource Area boundary that are administered by the BLM. For all other BLM special status plant species (including federal proposed and candidate species, federal species of concern, and New Mexico State endangered species), this includes all lands in public surface ownership within the Carlsbad Resource Area boundary that are administered by the BLM. All BLM special status plant species that have been documented to occur within the planning area are described below. Additional BLM New Mexico special status plant species that have the potential to occur within the planning area are included in Appendix Q.

Allred’s Flax (*Linum allredii*)

BLM Sensitive

Allred’s flax is a perennial suffrutescent herb in the flax (Linaceae) family. This species occupies sandy gypsum soils on scarps and hillsides between approximately 3,500 and 4,000 feet (1,000–1,300 meters) in elevation within the Yeso Hills in Culberson County, Texas, and Eddy County, New Mexico.

Within the planning area, there are 1,245 acres (5,038,316 square meters) of occupied habitat avoidance areas and 32,281 acres (130,635,650 square meters) of refined potential habitat. Species abundance estimates for this species are not yet available. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Refined potential habitat consists of lands sharing a combination of elevation, slope, karst occurrence potential, geological formations, soils, land cover, watersheds, annual average precipitation, annual average temperature, average summer maximum temperature, average winter minimum temperature, and distance from hydrological features in common with known Allred’s flax occurrences.

Chaplin's Columbine (*Aquilegia chaplinei*)

BLM Sensitive

Chaplin’s columbine is a perennial herb in the buttercup (Ranunculaceae) family. This species occupies limestone seeps and springs between 4,700 and 5,500 feet (1,400–1,700 meters) in elevation within the southern Sacramento and Guadalupe mountains in Hudspeth County, Texas, and Otero and Eddy Counties, New Mexico.

Within the planning area, there are 176 acres (713,930 square meters) of occupied habitat avoidance areas. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Potential habitat areas and species abundance estimates for this species are not yet available. All documented individuals are situated within the Lonesome Ridge ACEC.

Guadalupe Jewelflower (*Streptanthus sparsiflorus*)

BLM Sensitive

Guadalupe jewelflower is an annual in the mustard (Brassicaceae) family. This species occupies montane canyon bottoms between 5,000 and 7,000 feet (1,500–2,200 meters) in elevation within the Guadalupe Mountains in Culberson County, Texas, and Eddy County, New Mexico.

Within the planning area, there are 30 acres (122,791 square meters) of occupied habitat avoidance areas. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Potential habitat areas and species abundance estimates for this species are not yet available. All documented individuals are situated within the Lonesome Ridge ACEC.

Guadalupe Mescal Bean (*Dermatophyllum guadalupense*)

BLM Sensitive

Guadalupe mescal bean is an evergreen shrub in the pea (Fabaceae) family. This species occurs in outcrops of limy, gypseous, fine-grained sandstone between 5,200 and 6,700 feet (1,700–2,200 meters) in elevation within the Guadalupe and Brokeoff mountains in Culberson County, Texas and Otero and Eddy counties, New Mexico.

Within the planning area, there are 76 acres (306,843 square meters) of occupied habitat avoidance areas. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Potential habitat areas and species abundance estimates for this species are not yet available.

Guadalupe Penstemon (*Penstemon cardinalis* var. *regalis*)

BLM Sensitive

Guadalupe penstemon is a perennial herb in the plantain (Plantaginaceae) family. This species occupies montane slopes and canyon bottoms between 4,500 and 6,000 feet (1,400–1,800 meters) in elevation within Guadalupe Mountains in Hudspeth County, Texas, and Otero and Eddy Counties, New Mexico.

Within the planning area, there are 112 acres (454,787 square meters) of occupied habitat avoidance areas. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Potential habitat areas and species abundance estimates for this species are not yet available. All documented individuals are situated within the Dark Canyon and Lonesome Ridge ACECs.

Gypsum Milkvetch (*Astragalus gypsodes*)

BLM Sensitive

Gypsum milkvetch is a perennial herb in the pea (Fabaceae) family. This species occupies gypseous soils between 3,300 and 4,000 feet (1,000–1,200 meters) in elevation within Culberson and Hudspeth Counties, Texas, and Eddy County, New Mexico.

Within the planning area, there are 3,945 acres (15,966,222 square meters) of occupied habitat avoidance areas and 98,261 acres (397,646,259 square meters) of refined potential habitat. Species abundance estimates for this species are not yet available. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Refined potential habitat consists of lands sharing a combination of elevation, slope, karst occurrence potential, geological formations, soils, land cover, watersheds, annual average precipitation, annual average temperature, average summer maximum temperature, average winter minimum temperature, and distance from hydrological features in common with known gypsum milkvetch occurrences.

Gypsum Wild-Buckwheat (*Eriogonum gypsophilum*)

Federally Threatened

Gypsum wild-buckwheat is a perennial suffrutescent herb in the knotweed (Polygonaceae) family. This species occurs on ridges and slopes along gypsum outcrops and in adjacent gypsum soils between 3,200 and 3,600 feet (1,000–1,100 meters) in elevation within the Ben Slaughter Draw-Hay Hollow, North Seven River-South Seven Rivers, and Threemile Draw-Black River watersheds. All known occurrences of this species occur within the Carlsbad Resource Area in Eddy County, New Mexico.

Within the planning area, there are 522 acres (2,114,347 square meters) of federally listed critical habitat, 2,115 acres (8,559,880 square meters) of occupied habitat avoidance areas, and 10,817 acres (43,774,179 square meters) of refined potential habitat. Species abundance is estimated at 145,225 individuals throughout 69 acres (278,514 square meters) of estimated occupied habitat identified within the planning area.

Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 984 feet. Refined potential habitat consists of lands sharing a combination of elevation, slope, aspect, geological formations, soils, land cover, watersheds, karst occurrence potential, annual average precipitation, annual average temperature, average summer maximum temperature, average winter minimum temperature, and distance from hydrological features in common with known gypsum wild-buckwheat occurrences; refined potential habitat is clipped at 656 feet into marginal habitat from unverified suitable habitat. Estimated occupied habitat consists of total Sub-EO area multiplied by the mean density of occupied area per Sub-EO area; occupied area is delimited as the area occupied by groups of individuals that are within 16 feet of one another. Abundance estimates are based on a density of 0.52 (90%CI=0.06) individuals per 10.7 square feet throughout gypsum wild-buckwheat's range where individuals are delimited as ramets equal to or less than 1.9 inches on center from one another. These densities were calculated from random plots interspersed throughout this species' range; plots were mapped to occupied habitat, and individuals within each mapping unit were censused.

Gypsum wild-buckwheat was listed as federally threatened with critical habitat on January 19, 1981 (46 FR 5730), and a proposed rule to remove this species from the federal list of endangered and threatened plants because of recovery was posted on January 6, 2017 (82 FR 1657).

Kuenzler's Hedgehog Cactus (*Echinocereus fendleri* var. *kuenzleri*)

Federally Endangered

Kuenzler's hedgehog cactus is a hedgehog cactus in the cactus (Cactaceae) family. This species occurs on ridgetops and rocky limestone benches between 5,000 and 6,600 feet (1,500–2,000 meters) in elevation within the Vera Cruz Mountains (in Mexico), the Tucson Mountains (in Arizona), and the Guadalupe, Sacramento, Capitan, and Jicarilla Mountains (in southern New Mexico). Within New Mexico, this species occurs within Eddy, Chaves, Lincoln, and Otero counties. With the Carlsbad Resource Area, Kuenzler's hedgehog cactus occurs in Eddy and Chaves counties in the Guadalupe and southern Sacramento mountains. Between the years 1976 and 2015, a total of 4,330 unique individuals of this species were documented throughout its range.

Within the planning area, there are 11,876 acres (48,060,781 square meters) of occupied habitat avoidance areas, 496,803 acres (2,010,490,874 square meters) of rough potential habitat, and 242,435 acres (981,098,732 square meters) of refined potential habitat. Species abundance is estimated at 4,003 individuals throughout 33,358 acres (134,993,510 square meters) of unverified suitable habitat identified within the planning area.

Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Rough potential habitat consists of all land within the Guadalupe and southern Sacramento mountains at or above 5,000 feet (1,524 meters) in elevation. Refined potential habitat consists of unverified suitable habitat merged with known occupied habitat and buffered to 1,640 feet. Unverified suitable habitat consists of all land sharing elevation, soil, aspect, and precipitation values in common with Kuenzler's hedgehog

cactus observations known as of April 2017. Precipitation for unverified suitable habitat is defined as 16 or greater inches of average annual precipitation. Abundance estimates are based on a density of 0.12 individuals per acre for the southern Sacramento and Guadalupe Mountains Kuenzler's hedgehog cactus Element Occurrences (EOs). These densities were calculated from historic plot data in the Guadalupe Mountains EO and are not the result of a random, representative study design.

Kuenzler's hedgehog cactus was listed as federally endangered on October 26, 1979 (44 FR 61924), and a proposed rule to reclassify this species from endangered to threatened was posted on January 6, 2017 (82 FR 1677).

Lee's Pincushion Cactus (*Coryphantha sneedii* var. *leei*)

Federally Threatened

Lee's pincushion cactus is a pincushion cactus within the cactus (Cactaceae) family. This species occurs in shallow soils on limestone cracks, breaks and scree between 4,000 and 5,900 feet (1,200–1,800 meters) in elevation within the Guadalupe Mountains in Eddy County, New Mexico. Of the six canyons in which this species is known to occur, one canyon falls within the planning area.

Within the planning area, there are 162 acres (654,401 square meters) of occupied habitat avoidance areas. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Potential habitat areas for this species are not yet available. Between 1998 and 1999, 82 individuals were documented at two sites in the planning area. All individuals are situated within the Dark Canyon ACEC.

Lee's pincushion cactus was first listed as a threatened species on October 25, 1979 (44 FR 61554), and it is due for a Species Status Assessment in the year 2019.

Sheer's Beehive Cactus (*Coryphantha robustispina* var. *scheeri*)

State Endangered

Scheer's beehive cactus is a beehive cactus within the cactus (Cactaceae) family. This species occupies rocky and loamy soils on gypsum and limestone benches and bajadas between 3,300 and 3,600 feet (1,000–1,100 meters) in elevation within Brewster, Crockett, Loving, Pecos, Reeves, Terrell, and Ward Counties, Texas, and Chaves and Eddy Counties, New Mexico.

Within the planning area, there are 452 acres (1,830,195 square meters) of occupied habitat avoidance areas and 188,543 acres (763,007,213 square meters) of rough potential habitat. Species abundance estimates for this species are not yet available. Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Rough potential habitat consists of all mapped Reeves-Gypsum land complex (RG) and Simona-Bippus complex (SM) soil units within the Carlsbad Resource Area.

Tharp's Blue-Star (*Amsonia tharpii*)

Federal Species of Concern

Tharp's blue-star is a perennial suffrutescent herb in the dogbane (Apocynaceae) family. This species occupies a variety of substrates, including shallow, well-drained gypsum, caliche, and dolomite sedimentary outcrops and alluvium deposits, between 3,000 and 3,800 feet (900–1,200 meters) in elevation within Eddy County, New Mexico, and Pecos County, Texas. Three out of four EOs of this species are documented within New Mexico, and all three occur within the Ben Slaughter-Hay Hollow, Hart Canyon, Log Canyon Draw, Square Lake and Willow Lake-Pecos River watersheds in the Carlsbad Resource Area.

Within the planning area, there are 2,113 acres (8,552,920 square meters) of occupied habitat avoidance areas and 47,034 acres (190,338,226 square meters) of refined potential habitat. Species abundance is roughly estimated at 337,628 individuals throughout 220 acres (888,495 square meters) of documented occurrence area within the planning area.

Occupied habitat avoidance areas were calculated by buffering all species occurrence observations by 656 feet. Refined potential habitat consists of lands sharing a combination of elevation, slope, geological formations, soils, land cover, watersheds, annual average precipitation, annual average temperature, average summer maximum temperature, average winter minimum temperature, and distance from hydrological features in common with known Tharp's blue-star occurrences; refined potential habitat is clipped at 656 feet into marginal habitat from unverified suitable habitat. Abundance estimates are based on a density of 0.38 (90%CI=0.08) individuals per square meter. These densities were calculated from 2017 plot data in the Red Lake EO and are not the result of a random, representative study design. The occurrence area used to calculate this rough abundance estimate consists of all mapped Sub-Element Occurrence (Sub-EO) polygons merged with all observation points as buffered to 16 feet.

A partial 90-day finding on a petition to list Tharp's blue-star to the federal list of endangered and threatened plants was posted on December 16, 2009 (74 FR 66865); this petition found that listing Tharp's blue-star may be warranted. A Species Status Assessment of this species is due to be published in the year 2020.

3.2.6.2.2 Trends

The Carlsbad Field Office focuses special status species conservation efforts on identifying, maintaining, protecting, and enhancing habitat extent, quality, diversity, and connectivity. BLM special status plant species each have specialized habitats that have been altered or displaced by human activities and thereby reduced from their historic quality or extent. Anthropogenic activities that have contributed to habitat decline include historic fire suppression, historic overgrazing, brush encroachment, exotic plant introductions, herbicide treatments, hazardous materials spills, surface disturbance, surface displacement, hydrologic alterations, air pollution, vehicle travel, and recreation.

3.2.6.2.3 Key Features

Key features in the planning area consist of specific geographic areas and habitats associated with special status species. Strategic management of the following key physiographic features is vital to the conservation of BLM special status plant species in the planning area:

- Ben Slaughter Draw
- Cedar Canyon
- Chosa Draw
- Dark Canyon
- Eastern Guadalupe Escarpment
- Gypsum Soils
- Hart Canyon
- Hay Hollow
- Lonesome Ridge
- Mescalero Ridge
- Pierce Canyon
- Serpentine Bends
- Seven Rivers Hills
- Southern Sacramento Mountains
- Texas Hill
- Yeso Hills

3.2.6.3 Special Status Fish

3.2.6.3.1 Current Condition

Appendix Q identifies the current listings of special status fish species that may occur in the planning area. Note that all federally listed species are also considered BLM Special Status Species.

Endangered Species

Pecos Gambusia (*Gambusia nobilis*)

The Pecos gambusia is a live-bearing fish and is similar to the killifish and topminnow family (Cyprinodontidae). The species is about 2 inches in length when fully grown. This Pecos gambusia has a dark lateral strip and a metallic gray-blue color.

The Pecos gambusia is most common in heads and runs of springs, where it uses such cover as aquatic vegetation for refuge (Bednarz 1975, 1979). The fish associates in loose schools that spend much of the time near the surface, typically near the edges of any body of water. The Pecos gambusia inhabits shallow areas of alkaline waters with aquatic vegetation for cover.

The springs and gypsum sinkholes on Bitter Lake National Wildlife Refuge near Roswell and Blue Spring and its outflow near White's City are the only known areas of regular occurrence of Pecos gambusia in New Mexico (Bednarz 1979; Echelle and Echelle 1980). The largest population is at Blue Spring, where many thousands of these fish occur (Koster 1957). The state's other, much smaller population occupies the limestone sinks and associated areas on Bitter Lake National Wildlife Refuge. In Blue Spring, Pecos gambusia were common in headwaters and diminished in abundance in the spring run as it flowed to its confluence with Black River (Bednarz 1979; Echelle and Echelle 1980). Within ponded habitats and gypsum sink holes on Bitter Lake National Wildlife Refuge and Blue Spring, the Pecos gambusia appears stable.

The Pecos gambusia was federally listed as endangered on October 13, 1970 (*Federal Register* Vol. 46, No. 12) and listed as endangered in 1975 by the State of New Mexico (19 New Mexico Annotated Code [NMAC] 33.1). The identified population of the species occurs on privately owned land.

Threatened Species

*Pecos Bluntnose Shiner (*Notropis simus pecosensis*)*

The Pecos bluntnose shiner is a relatively small, moderately deep-bodied minnow, rarely exceeding 3 inches. Females release non-adhesive, semi-buoyant eggs in the water column and males immediately fertilize them (NMDGF 2004). After fertilization, the eggs drift with the current. Development of eggs is rapid and larvae hatch in 24 to 48 hours (NMDGF 2004).

Hatch et al. (1985) reported that Pecos bluntnose shiner may live 3 years, but most individuals probably survive less than 2 years. Most growth occurs in the first year of life. Maturity is attained by year 1.

The Pecos bluntnose shiner is endemic to the Rio Grande and the Pecos River in New Mexico and the El Paso/Ciudad Juarez area of Texas and Chihuahua (Gilbert 1980; Chernoff et al. 1982). The species historically occupied the Pecos River from near Santa Rosa downstream to the vicinity of Major Johnson Springs, now inundated by Brantley Reservoir (Hatch et al. 1985). Currently, this shiner is found only in the Pecos River from about the U.S. Highway 60 Bridge near Fort Sumner downstream to Artesia, and seasonally within the inflow area of Brantley Reservoir. Within the planning area, designated critical habitat occurs from the Chaves/Eddy County line to Highway 82 running east from Artesia (see Map 3-8 in Appendix B).

The Pecos bluntnose shiner was listed by the State of New Mexico as threatened (19 NMAC 33.1) in 1976 (USFWS 1987). The species is listed as endangered in Texas (Texas Parks and Wildlife Department 1993) and the Republic of Mexico (Mexico Ministry of Social Development 1991). Abundance of the Pecos bluntnose shiner has declined considerably in the past 50 years (NMDGF 2004).

Pecos bluntnose shiner critical habitat is divided into two separate reaches designated as upper and lower critical habitat (USFWS 1987). Lower critical habitat is a 37-mile reach extending from Hagerman to Artesia. The lower critical habitat is within the CFO boundaries. This area was chosen for critical habitat designation because of permanent flow and populations of the Pecos bluntnose shiner.

3.2.6.4 Special Status Wildlife

3.2.6.4.1 Current Condition

Descriptions of federally threatened, endangered, and candidate species with potential to occur in the CFO planning area are included in Appendix Q. Note that all federally listed species are also considered BLM Special Status Species.

Endangered Species

*Northern Aplomado Falcon (*Falco femoralis septentrionalis*)*

The northern aplomado falcon once extended from Trans-Pecos Texas, southern New Mexico, and southeastern Arizona in the United States, south through Chiapas and the northern Yucatán along the Gulf Coast of México, and along the pacific slope of Central America north of Nicaragua (Howell 1972). According to Hector (Keddy-Hector 1990), the falcon once inhabited the southern third of the planning area, although this species is now very rare in New Mexico. In 2001, 2002, and 2003, falcon nesting was documented south of Deming, New Mexico. Previously, the last documented falcon nest in New Mexico was in 1952. Sightings of falcons are increasing in the southwestern United States due to experimental releases, with a number of sightings occurring in the last five years across the western half of planning area. Successful release projects in Texas and New Mexico have increased the potential for breeding pairs to occur in the United States (Montoya et al. 1997).

Falcons appear to be year-long residents across most of their northern range where populations currently exist in Mexico. Nesting primarily occurs from March to June in northern Chihuahua, Mexico. Falcons typically use stick nests constructed by other large birds such as Swainson's hawks, white-tailed hawks, red-tailed hawk, Chihuahuan ravens (*Corvus cryptoleucus*), and possibly white-tailed kites (*Elanus leucurus*). Nests are usually situated in soaptree yuccas (Montoya et al. 1997), the tops of mesquite trees, human-made structures, or any other structure tall enough to avoid predation from animals such as coyotes and skunks.

Prey species of the falcon vary from small birds to insects (Hector 1985). Migratory bird numbers have declined in New Mexico and the Chihuahuan Desert, including the Hope Study Area, located in the northwestern portion of the planning area. Native brush encroachment and agricultural development, including pesticide contamination, account for much of the declining condition of desert grasslands within the former range of the falcon. Within the historic falcon range in the planning area, brush encroachment is mainly due to two main factors: historical overgrazing and wildfire suppression. Within the Hope Study Area, long-term efforts to reduce the density of native brush and restore historic grasslands have been implemented to improve habitat for the falcon.

On July 26, 2006, a final rule on the establishment of a nonessential experimental population in Arizona and New Mexico under Section 10(j) of the ESA was published in the *Federal Register*. This designation authorizes unintentional or incidental take of the aplomado falcon pursuant to otherwise legal actions, but still prohibits intentional take. Aplomado falcon habitat is split into four habitat categories, or management areas, within the planning area: aplomado falcon grasslands habitat (totaling 101,007 acres), aplomado falcon grasslands boundary level 1 habitat (totaling 98,540 acres), level 2 habitat (totaling 125,284 acres), and level 3 habitat (totaling 17,310 acres). The habitat currently experiences minimal disturbance (see Map 3-9 in Appendix B).

*Interior Least Tern (*Sterna antillarum athalassos*)*

Preferred tern habitat is associated with riverine or lake shorelines where the birds use the sparsely vegetated sand and gravel bars within or salt flats for nesting. This species is a colonial nesting shorebird and although it is associated with water, it spends most of its time on sand bars, playas, or snatching its food from the surface of the water. The riverine nesting areas

This species is presently known in Chaves County along the Pecos River within the Bitter Lake National Wildlife Refuge. It would only be considered an accidental migrant to Eddy, Lea, and Roosevelt Counties, and the remainder of Chaves County. Since 2008, a small breeding population has occasionally been observed around the Brantley Reservoir in Eddy County.

The interior least tern was listed as endangered on May 28, 1985, without critical habitat (*Federal Register* Vol. 46, No. 12). It is also listed by the NMDGF.

Currently all known nesting sites are located on Bureau of Reclamation–managed land. Nest locations have the potential of being impacted by upstream water discharges.

*Texas Hornshell (*Popenaias popeii*)*

This mussel occurs in sand and sand-cobble accumulated in travertine bedrock cracks and at the base of large boulders at depths of 0.8 to 4.5 feet and at flow rates of 0.78 to 29.5 inches per second, often in colonies and at the head or lower end of travertine runs (Carmen 2007). The species imbeds itself in softer bottoms, exposing only the siphonal areas in such situations. In rocky sites, it lodges itself in cracks and crevices. In the latter situation, the species is probably immobile, whereas it undoubtedly moves about in substrates such as mud and sand.

Historically, the Texas hornshell occurred in the lower Pecos River of New Mexico, downstream throughout the lower Rio Grande (Brownsville, Texas) and major tributaries in Texas, southward to the Río Pánuco drainage of San Luis Potosí, México (Metcalf 1982). In New Mexico, this species was common in the lower Pecos River from North Spring River near Roswell in Chaves County (Cockerell 1902), including the Black and Delaware Rivers, Eddy County (Metcalf 1982) (see Map 3-8 in Appendix B for reintroduction and habitat study areas). The hornshell has declined notably throughout its historic range.

This species was listed as a candidate species on October 30, 2001,and was proposed as an endangered species on August 10, 2016. The Texas hornshell has been determined to be an endangered species (50 CFR 17.11(h)) by USFWS pursuant to the ESA (1973). This determination was published in the Federal Register (83 FR 5720-5735) on February 9, 2018, and became effective on March 12, 2018. The BLM is working on updating its draft language to reflect the change associated with this RMP. Status assessment of the Texas hornshell throughout its historic range is ongoing with inventory efforts being coordinated between the USFWS, the NMDGF, the Texas Parks and Wildlife Department, and private land stewards.

Threatened Species

*Mexican Spotted Owl (*Strix occidentalis lucida*)*

The Mexican spotted owl occupies mountainous areas, with its preferred habitat consisting of dense, multi-storied forests with mostly closed canopies. In addition, these owls have been found in canyon systems with little or no tree cover and appear to provide the same or similar microclimate as dense multi-storied forests (*Federal Register* Vol. 58, No. 49, pg. 14248–14271).

The range for the Mexican spotted owl extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona and New Mexico, and far western Texas, through the Sierra Madre Occidental and Oriental, to the mountains at the southern end of the Mexican Plateau (*Federal Register* Vol. 58, No. 49, pg. 14248–14271).

In New Mexico, the owl has been recorded in all montane regions from the San Juan, Jemez, and Sangre de Cristo Mountains in the north, to the Guadalupe and Animas Mountains in the south. The largest concentration occurs in the Mogollon and Sacramento Mountains (*Federal Register* Vol. 58, No. 49, pg. 14248–14271).

The Mexican spotted owl was listed as threatened on March 16, 1993 (*Federal Register* Vol. 58, No. 49, pg. 14248–14271). This species is currently not listed by the State of New Mexico. No critical habitat has been designated by the USFWS on any BLM-administered land. Within the planning area, this species is only known to occur within the Guadalupe Mountains (U.S. Forest Service [USFS]) and Carlsbad Caverns National Park (*Federal Register* Vol. 58, No. 49, pg. 14248–14271).

*Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)*

In New Mexico, the species was historically rare statewide, but common in riparian areas along the Pecos River and Rio Grande (USFWS 2001). The species is thought to have been fairly common in the mid-1980s along the Rio Grande between Albuquerque and Elephant Butte Reservoir, and along the Pecos River in southeastern New Mexico. Numbers along the Pecos may have increased in response to saltcedar colonization of riparian areas formerly devoid of riparian vegetation (Howe 1986).

Riparian habitat degradation and/or loss of cottonwood regeneration have likely led to a loss of suitable habitat and to eventual decline of this species. Grazing also contributes to degradation and loss of riparian habitats.

The yellow-billed cuckoo is currently listed as a threatened species in western North America as a distinct population segment (DPS) (USFWS 2014). It was formerly listed as a candidate species under consideration as a DPS occurring in the western United States, the division being the Continental Divide from Montana to central Colorado, the eastern boundary of the Rio Grande drainage from central Colorado to Texas, and the mountain ranges that form a southeastern extension of the Rocky Mountains to the Big Bend area in west Texas (USFWS 2013b). In 2005, the USFWS revised the listing priority of the yellow-billed cuckoo DPS from 6 to a higher priority of 3 to better reflect the fact that threats are imminent to this DPS (USFWS 2013b). The USFWS defines the listing priority as a number from 1 to 12 indicating the relative urgency for listing plants or animals as threatened or endangered. The criteria used to assign this number reflect the magnitude and immediacy of a threat to the species, as well as the relative distinctiveness or isolation of the genetic material they possess.

Candidate and Proposed Species

*Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*)*

In New Mexico, the lesser prairie-chicken formerly occupied a range that encompassed the easternmost third of the state, extending from the Pecos River to 30 miles west near Fort Sumner. This occupied area covered about 14,672 square miles in nine eastern counties: Union, Harding, Chaves, De Baca, Quay, Curry, Roosevelt, Lea, and Eddy, at the beginning of the twentieth century. Remnant populations are known to exist only in parts of Lea, Eddy, Chaves, and Roosevelt Counties (see Map 3-9 in Appendix B). The currently occupied area comprises about 20% of the historical range and consists of 205 acres within the planning area.

Lesser prairie-chickens are found throughout dry grasslands that contain shinnery oak or sand sagebrush. Currently, they are most commonly found in mixed-grass vegetation, sometimes with short-grass habitats. They are occasionally found in farmland and smaller fields, especially in winter. Shinnery oak shoots are used as cover and produce acorns, which are important food for the species. The current geographic range of shinnery oak is nearly congruent with that of the lesser prairie-chicken, and these species sometimes are considered ecological partners. Population densities of lesser prairie-chicken are greater in shinnery oak habitat than in sand sagebrush habitat.

Lesser prairie-chickens use a breeding system in which males form display groups on arenas called leks. During mating displays, male vocalizations, called booming, attract females to the lek. Leks are often on knolls, ridges, or other raised areas; however, leks are just as likely to be on flat areas in New Mexico. Leks may be completely bare, covered with short grass, or have scattered clumps of grass or short tufts of plants. Visibility of surroundings and ability of the females to hear the male vocalizations are important characteristics of occupied leks.

In 1987, there were 35 documented active leks known to exist in the planning area. Survey data from 1971 through 1997 analyzed by New Mexico Natural Heritage show a clear and substantial decline in population after 1988, particularly in the southern periphery of their range. Intensive spring lek surveys in the planning area in 2001 detected only one remaining active lek occupied by two males. Recent surveys found small, scattered groups of birds around historic lek sites. Lesser prairie-chicken populations on BLM-administered lands and surrounding areas south of Highway 380 in Eddy and Lea Counties are very near extirpation. The Mescalero Sands region of the CFO is considered a critical geographic area and habitat for the lesser prairie-chicken.

In June 1998, the USFWS issued a statement regarding their status review of the lesser prairie-chicken. It stated, “Protection of the lesser prairie-chicken under the Federal Endangered Species Act (ESA) is warranted but precluded which means that other species in greater need of protection must take priority in the listing process.” Given the current federal candidate status of this species, the BLM is mandated to carry out management consistent with the principles of multiple use, for the conservation of candidate species and their habitats, and shall ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered (BLM Manual 6840.06). This species was proposed for listing as threatened in September 2013, and the USFWS announced the final listing of the species as threatened under the ESA in March 2014.

On March 27, 2014, the USFWS in response to the rapid and severe decline of the lesser prairie-chicken, announced the final listing of the species as threatened under the ESA, as well as a final special rule under Section 4(d) of the ESA that will limit regulatory impacts on land owners and businesses from the listing. However, this ruling (including the special rule) was petitioned and the USFWS was ordered to vacate the threatened ruling. This species currently remains under review.

The Special Status Species Resource Management Plan Amendment of 2008 (SSSRMPA) provided guidance for managing approximately 850,000 acres of federal land and 300,000 acres of federal minerals in portions of Chaves, Eddy, and Lea Counties (BLM 2008a). The SSSRMPA identified 17 habitat areas (HAs) for the lesser prairie-chicken. Three criteria must be met for an area to be considered habitat area: 1) it must have evidence of lesser prairie-chicken within the last 5 years and/or documented historic sightings; 2) it must be within shinnery oak-dune plant community and provide suitable vegetation to meet seasonal lesser prairie-chicken requirements; and 3) the area must be of a minimum patch size of 320 acres that has not been fragmented by development. As of September 2014, the CFO is preparing an environmental assessment to analyze which of the 17 HAs areas meet the criteria to be classified as habitat areas. Those areas meeting lesser prairie-chicken habitat requirements would be afforded special management and mitigation provisions to protect potential habitat. For those areas considered as occupied (leks), suitable, and potentially suitable within the primary population area, restrictions on development and/or appropriate buffers would be implemented.

3.2.6.4.2 Indicators for Special Status Species

Indicators used are the same as those described above for wildlife.

Special status species diversity and abundance is directly related to maintaining habitat availability, diversity, and quality. The majority listed species historic native ranges have been drastically altered or substantially reduced in size. For this reason, the analysis indicator for special status species consists of acres of habitat.

Habitat degradation in the form of unmanaged grazing, historic overgrazing, oil and gas development, and brush encroachment have reduced the quality of the shinnery oak grasslands and dune complexes, contributing to the decline of lesser prairie-chicken and dunes sagebrush lizard populations in the planning area. Disruptive human activity and noise disturbance (e.g., drilling rigs, pipeline compressors, pumpjacks, highways) may also be a factor in declining lesser prairie-chicken populations. Male lesser prairie-chickens rely on using vocalization to attract a mate, and such noise disturbances may inhibit the female's ability to hear these calls. Perhaps the largest contributing factor to the decline of dunes sagebrush lizards has been habitat fragmentation from oil and gas development. Pipeline ROWs, access roads, and other surface disturbances act as barriers and may potentially isolate lizard populations. The northern aplomado falcon's preferred habitat of native desert grasslands have drastically declined due to brush encroachment and agricultural development, including pesticide contamination.

In addition to the efforts associated with Restore New Mexico, the CFO is currently working on a multitude of management practices to minimize habitat degradation from other resource uses. Rangeland conservation practices have been implemented to slow the effects of cattle grazing to further degrade habitat. CFO staff members are working closely with industry representatives to use BMPs and locate projects away from areas and resources of concern. This has minimized the impacts to multiple special status species. Several other BMPs, stipulations, and restrictions (e.g., lesser prairie-chicken timing stipulations) have also been created in attempts to further minimize the adverse effects from human activity.

In 2008, a Candidate Conservation Agreement (CCA)/Candidate Conservation Agreement with Assurances (CCAA) program was initiated by the BLM, the USFWS, and the Center of Excellence for Hazardous Materials Management. These organizations are working in cooperation with industry and land owners in support of conservation measures for the lesser prairie-chicken and dunes sagebrush lizard. The agreements allow the parties to work cooperatively on habitat restoration projects exclusively in areas identified as significant to these species.

3.2.7 Wildland Fire and Fuels Management

3.2.7.1 Fire Regime

BLM direction requires current and desired resource conditions related to fire management to be described in terms of historic fire regime, current condition class, and desired future conditions. This plan includes a description of historic fire regimes, departure from historic reference conditions as measured by Vegetation Condition Class (VCC), and defines desired conditions using VCC. This is slightly different than Fire Regime Condition Class (FRCC), which was used in the 2004 RMPA for Fire and Fuels Management. FRCC is a "classification of the amount of departure of conditions at a given time period (such as current or future) from ecological reference conditions. Pre-settlement ecosystems are commonly used as a benchmark for reference conditions and include possible Native American influence in the natural fire regimes and associated vegetation" (Barrett et al. 2010:95). VCC is calculated based on changes to species composition, structural stage, and canopy closure using methods described in the Interagency Fire Regime Condition Class Guidebook. LANDFIRE VCC is based on departure of current vegetation conditions from reference vegetation conditions only, whereas the Interagency Fire Regime Condition Class Guidebook approach includes departure of current fire regimes from those of the reference period (LANDFIRE 2016).

Fire regime is an indicator of the role fire plays in an ecosystem. A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention but including the possible influence of aboriginal fire use (Agee 1993; Brown 1995). The BLM uses five historic fire regimes based on average number of years between fires (fire frequency) combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. The historic fire regimes are described in Table S.9 in Appendix S. The majority of the planning area is within historic fire regime IV (mixed severity). Historic fire regime II (stand replacement) covers much of the remainder of the planning area. Fire regime III (mixed severity) is in the northern portion of the planning area. Fire regime I (low severity) is found along the western periphery of the planning area.

Some fuels in the planning area have undergone significant departure from their historic fire regime reference condition. Changes to key ecosystem components may include vegetation characteristics (species composition, structural stage, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances, such as insect and disease mortality, grazing, and drought. Common causes of departure include advanced succession, effective fire suppression, livestock grazing, introduction and establishment of exotic plant species, and introduced insects and disease (Brown and Smith 2000; Schmidt et al. 2002; Brown et al. 2004; Hood and Miller 2007; Tausch and Hood 2007; Stambaugh et al. 2008; Keane et al. 2009).

Some areas in the southwestern portion of the planning area that would be classified as fire regime I have become significantly altered from their historical range, creating potential for loss of key ecosystem components. These areas are considered unhealthy and non-functioning (Schmidt et al. 2002). In addition, some areas classified as fire regime II that historically would have burned frequently (0–35 years) with stand replacement severity have been moderately altered from their historic range, burning with decreased fire frequency and resulting in possible deterioration or loss of key ecosystem components. In contrast, many areas of the district in fire regime IV that historically burned infrequently (35–100+ years) have for the most part remained near or within their historical range of variability, the fire regime remaining relatively intact with ecosystem components functioning and healthy.

The 2004 RMPA for fire management provided management objectives to return lands outside the wildland urban interface (WUI) to within their historical range of variability using treatments that include prescribed burning and mechanical fuels reduction. Within WUI areas, departure from the historic fire regime reference condition would not be used as the target condition because these areas may be maintained in an earlier seral state necessary to reduce fire behavior and protect life and property.

3.2.7.2 Wildland Fire Management

The CFO fire management program seeks to protect public safety, life, and property while focusing on two types of wildland fire: wildfire (unplanned) and prescribed (planned). Objectives include reducing hazardous fuels, maintaining or improving watershed conditions, controlling noxious and invasive species, and incorporating the role of wildland fire as an essential ecological process and natural change agent into the planning process. Firefighter and public safety are the highest priority in every fire management activity.

Both wildfire and prescribed fire can be used as management tools to achieve predetermined objectives established by the land use plan as amended (2004) and the CFO FMP (BLM 2010b). The fire program objectives are to concentrate fire suppression efforts in areas containing high resource or human values, as well as those with intermingled land ownership patterns, and to use prescribed fire and other fuel treatments to meet the objectives of other programs.

The Response to Wild Fire (RWF) is based on values to be protected from or enhanced by wildland fire. The RWF is based on ecological, social, and legal consequences of fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected, dictate the response to fire. The RWF takes into consideration all resource values and concerns across jurisdictional boundaries.

3.2.7.2.1 Wildfire

According to the National Interagency Fire Center, “A wildfire is an unplanned ignition (such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires) and escaped prescribed fires (National Interagency Fire Center 2009:17). The protection of human life is the single overriding priority for the fire management program. Other priorities include protection of communities, property and improvements, natural and cultural resource values, human health and safety, and the costs of suppression. All wildfires within the planning area are managed using suppression actions consistent with the resource management objectives identified in the CFO FMP (BLM 2010b), current national policy, and land use plans.

Each wild fire would receive management actions selected after comprehensive consideration of the local situation, risk to firefighter and public safety, current and forecast weather, land and resource management objectives, threats and values to be protected, cost efficiencies, external concerns, and land use concerns necessary to accomplish specific objectives for the individual fire.

No wild fire is automatically categorized as having a lower priority than others. A wildland fire may be concurrently managed for one or more objectives, and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives. Fire management approach also takes into consideration natural resource values such as special status species, protection of riparian areas, cave and karst areas, steep and unstable slopes and topography and potential invasion by exotic species, as well as cultural resource values.

Initial action on human-caused wildfire is to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety. The BLM is a partner in the New Mexico Joint Powers Master Agreement for Interagency Wildland Fire Protection (JPA). This is an agreement among federal wildland fire management agencies and the New Mexico State Forestry Division to coordinate wildland fire management activities. This provides an equitable exchange of protection and workload and allows the use of the “closest forces” concept for fire suppression.

The planning area contains 21 rural volunteer fire departments that respond to wildland fires on BLM and adjacent lands. The BLM works with local rural fire departments to reduce the risk of wildland fire in communities, thereby protecting homes and adjacent public lands. The BLM provides wildland firefighter training and assists with Community Wildfire Protection Plan (CWPP) development and implementation. BLM personnel provide public education through programs including Smokey Bear and fire education

programs in schools, as well as Firewise programs. Key features are protection priority areas, including structures, oil and gas fields and related facilities, communication sites and related facilities, cultural sites and historic structures, power lines, communities, important wildlife habitat, and lands having intermingled public, state, and private ownership where there are currently no agreements for using wildfire to meet resource management objectives, as well as other areas identified through continued public involvement in fire planning efforts.

Current Condition

Since the 2000 fire season, the Pecos Zone averages 354 wildfires with an average of 152,369 acres burned per year. The lowest recorded number of fires and acres burned in a single year was 2004, with 132 fires burning 483 acres. The highest recorded number of wildland fires was 2011, with 771 fires burning 813,124 acres. The Pecos Zone consists of the Lincoln National Forest and lands managed by the BLM (CFO and Roswell Field Office), the USFWS (Bitter Lake National Wildlife Refuge), the Bureau of Indian Affairs (Mescalero Agency), the NPS (Big Bend, Guadalupe Mountains, and Carlsbad Caverns National Parks), and the New Mexico State Forestry Division (Capitan District).

Table S.10 in Appendix S shows the number of fires and acres burned on BLM-administered lands within the planning area between the 2001 and 2017 fire seasons. Prior to 2001, CFO and Roswell Field Office fires were not separated by field office. Fires whose point of origin was on another agency's land and burned onto BLM-administered land are not included.

Fire occurrence in the planning area has been marked by cycles of intense wildfire activity followed by periods of minimal wildfire activity. Since 2001, 557 wildfires have burned 148,849 BLM acres within the planning area. Lightning is the ignition source for approximately 27% of the fires and accounted for 58% of the burned acreage. Human-caused fires are usually from equipment use (e.g., vehicles, machinery, welding, grinding), power lines, and negligence. Human-caused fires accounted for 73% of fires and 42% of the burned acreage.

The occurrence of uncharacteristically severe and large wildfires has increased substantially in the western United States in recent decades. Impacts of these fires in the planning area have included increased spread of invasive and noxious weeds, damaged oil and gas infrastructure, and loss of forage base and damaged infrastructure for livestock operations. Associated with the impact on livestock grazing are the negative consequences affiliated with modification or closure of grazing allotments, and the resulting economic impact on grazing permittees and related regional socioeconomics.

Human development continues to expand in all portions of the planning area. Continued emphasis should be placed on preparation of cooperative and collaborative fuel reduction projects, as well as fire mitigation education for property owners in the WUI.

Trends

Wildfires have not been utilized to meet resource objectives to date. Coordination and planning steps need to be taken to manage wildfire in areas where fire would benefit vegetation and habitat resources. The decision to allow natural fire requires a complete analysis of the potential negative environmental impacts, as well as any potential benefit. In addition, the analysis of positive and negative effects to resources from both continued suppression and modified suppression is needed. Firefighter and public safety is always the first priority.

Wildland-Urban Interface

New demands are being placed on public lands due to accelerated growth in and around communities in the planning area. Growth has changed the way communities relate to surrounding public lands and has changed the expectations of communities. Effective management of public lands must address issues of public health and safety through the use of effective hazardous fuels treatments and strategic fire suppression actions in WUI areas. The Firewise program is pivotal in working with private land owners to reduce the amount of fuels in and around structures within the WUI. A collaborative effort among land owners, the BLM, and Firewise is necessary to ensure that private property is less susceptible to damage from wildfires.

All three counties within the planning area have completed CWPPs, an important step in addressing fuels management actions regardless of land ownership or jurisdiction. The Eddy and Lea County CWPPs were completed in 2008 and the Chaves County CWPP was completed in 2010 and is undergoing a 2013/2014 update. The CWPPs assess the level of wildfire risk to communities and establish priorities for fire mitigation and protection within the counties. The areas of concern are prioritized based on fuel hazards, risk from wildfire, infrastructure, and other values such as watersheds.

3.2.7.3 Fuels Management

Fuels treatments use various tools, such as prescribed fire, mechanical treatments, and herbicides, to reduce hazardous fuel loadings and achieve resource objectives (see Section 3.2.7.3.1 for information on the CFO's prescribed fire program). The Decision Record and RMP Amendment for Fire and Fuels Management on Public Land in New Mexico and Texas (BLM 2004) contain a goal of annually treating 28,789 acres in the planning area with prescribed fire and non-fire treatments.

3.2.7.3.1 Prescribed Fire

Prescribed fire is applied under specific fuel and environmental conditions to achieve resource objectives, such as improving habitat and plant community health and reducing hazardous fuels. The fire program in the planning area has been managed to protect public safety, life, and property using fuels treatments. Fire and fuels treatments are management tools used to maintain or increase age-class diversity within vegetation communities; rejuvenate fire-dependent vegetation communities; maintain or increase vegetation productivity, nutrient content, and palatability; and maintain or improve wildlife habitat and watershed condition. Fire is considered a management tool to meet plan objectives for vegetation, wildlife, rangeland health, and fire management and may be used to dispose of slash generated by mechanical vegetation manipulation, reduction of hazardous fuels, forest and rangeland health improvement, and grazing management.

Current Condition

Prescribed fire activities occur year-round in the planning area. There are many factors that impact the success of managed fire, including weather conditions that are outside BLM control. Although prescribed fires are most often implemented successfully, fires can become uncontrolled due to a number of factors, including unanticipated weather changes.

The locations of prescribed fires are primarily selected so that fire would improve watershed conditions while secondarily targeting areas of hazardous fuel loadings. Project area boundaries are established to enable appropriate containment and control of the prescribed fires. There are locations and fuels situations that are not appropriate for fire treatment, such as areas with high potential for erosion or weed infestation. The majority of pile burning takes place during the monsoon season. Grassland and shrubland broadcast burns take place before green-up in mid-spring through early summer. Piñon-juniper woodland broadcast burns take place during late spring and summer and have the tightest windows for opportunity, as they require the warmest and driest parameters to meet objectives.

Actual prescribed fire accomplishments vary greatly from year to year due to weather patterns, while actual mechanical and herbicide treatment accomplishments tend to be based on annual budget allocation.

Trends

Since 2003, the CFO has conducted prescribed fires on 60,690 acres. Drought conditions and wildfire activity curtailed planned projects in 2003, 2004, 2007, and 2013.

3.2.7.3.2 Mechanical Treatments

When fire is judged to be too risky or ineffective under acceptable prescriptions, mechanical treatments can be effective in meeting resource objectives.

Current Condition

Approximately three to four mechanical fuels treatment projects for a total of 200 to 400 acres are planned each year, primarily as maintenance within existing riparian projects across the planning area. In addition to mechanical treatments, chemical treatments are used for fuels reduction. Most of the Delaware River and the Black River have been mechanically treated. The chemically treated saltcedar along the Pecos River has been piled and burned. Saltcedar is treated with the herbicide Imazapyr. Creosote bush and juniper are treated with the chemical Tebuthiuron to reduce encroachment onto historical grasslands. Mesquite is treated with the chemicals Clopyralid and Triclopyr to reduce encroachment onto historical grasslands. These treatments are being monitored and evaluated to determine if they are effective tools for fuels reduction in the future.

Mechanical treatments are not excluded from any area and may be used at any time to meet specific fuels reduction needs that might include preparation for prescribed fire treatments, protection of private property or developments on BLM-administered lands, or protection of important wildlife habitat or cultural sites. Widespread use of mechanical treatments, however, is not anticipated due to the higher costs.

Fuels treatments since Fiscal Year 2003 are summarized in Table S.11 in Appendix S. Fuels treatments would focus on maintaining or continuing to improve Restore New Mexico projects with prescribed fire and returning areas close to their original fire regime reference condition.

Trends

The number of fuels and restoration projects within the planning area is increasing in order to address watershed health. As outlined in the RMPA for Fire (2004) and the CFO FMP (BLM 2010b), projects within the fuels program have focused on achieving two goals: reducing the fire hazard with an emphasis on WUI areas and restoring or improving the fire regime.

3.2.7.4 Emergency Stabilization and Rehabilitation

The Burned Area Emergency Stabilization and Rehabilitation Plan (ESR) is an interdisciplinary response to protecting natural resources and threats to human health and safety. The guidelines for development of this plan are outlined in BLM Handbook H-1742-1.

All wildfires are analyzed for the need to implement an ESR plan after the fire is contained. Key indicators of the need for an ESR plan are significant areas of high severity fire, steep terrain, high probability of proliferation of noxious weeds after the fire, and threats to human health and safety, or loss of infrastructure. Very few fires require a plan.

An active ESR program exists within the planning area. Emergency stabilization is defined as “planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life and property resulting from the effects of the fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources” (620 DM 3.3E.).

Rehabilitation is defined as “efforts undertaken within three years of containment of a wildland fire to repair or improve fire damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire” (620 DM 3.3M). The objectives of rehabilitation are 1) to evaluate actual and potential long-term post-fire impacts to critical cultural and natural resources, and identify those areas unlikely to recover naturally from severe wildland fire damage; 2) to develop and implement cost-effective plans to emulate historical or pre-fire ecosystems consistent with approved land management plans, or, if that is not feasible, to restore or establish a healthy, stable ecosystem in which native species are well represented; and 3) to repair or replace minor facilities damaged by wildland fire (620 DM 3.4B).

3.2.7.4.1 Current Condition

Fires throughout the West have become larger and more intense and have threatened the natural integrity of the burnt ecosystem, as well as becoming a threat to human health and safety. The recovery of burnt landscapes, especially large, landscape-level fires, sometimes requires actions to maintain the integrity of the natural resources and the safety of adjacent communities. The need for stabilizing and rehabilitating

burnt areas has become increasingly important. Some areas do not successfully recover with native vegetation and become dominated by noxious weeds and non-native species. Many communities adjacent to wildfires are threatened by significant erosion of bare soil, loss of public infrastructure, and contamination of water resources.

Most rehabilitation actions are directed at infrastructure damage resulting from fire. ESR plans were first developed for wildfires in the planning area in 2008. Increased need for ESR plans has corresponded with the increase in larger fires.

3.2.7.4.2 Trends

The trends of the stabilization and rehabilitation program correspond with those of wildfire, increasing with larger and more intense fires and longer fire seasons. A small percentage of the wildfires in the planning area have required varying degrees of rehabilitation consisting primarily of rebuilding fences and replacing livestock waterlines damaged by wildfire.

3.2.8 Cultural Resources

Cultural resources can be defined as “a definite location of human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence” (BLM 2015b). These include archaeological and historic sites, as well as Traditional Cultural Properties (TCPs), defined as sites sacred or culturally important to the continued identity of a living community. Types of ancestral Native American sites across the planning area include scatters of lithic and ceramic material, burned rock ring middens, temporary and long-term habitation sites with features, rock shelters, and rock art. TCPs of Native Americans have also been identified within the planning area. Historic Anglo/Euro-American sites are associated with homesteading, cattle ranching, agriculture, and oil, gas, and potash exploration. These sites might include the remains of houses, water wells, earthen tanks, windmills, fences, irrigation ditches, railroads, and abandoned oil, gas, and potash installations.

The BLM is responsible for the protection and preservation of the cultural resources that contribute significantly to the knowledge of the prehistoric and historic past, and to share that knowledge with the public through interpretation and education. Historic properties from all time periods and cultures are potentially important and can provide tangible links for current populations to connect to their heritage, both individually and as a group. The CFO also has an objective to formulate, administer, and publish research that will augment and improve upon the knowledge of human occupation and adaptation in southeastern New Mexico, as well as advance the methods of cultural resource management. The interrelated goals of preservation and research provide a unique opportunity for the CFO to be a leader in cultural resource management and public archaeology.

The primary way that historic properties are identified and managed is through compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, and the implementing regulations of 36 CFR 800. This law defines historic properties as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior” (36 CFR 800.16 (l)(1) and recognizes them as valuable but endangered resources of the nation and considers the effects on them from federal undertakings. Federal agencies are required to make a reasonable and good faith effort to identify historic properties, evaluate their significance, and consider the effects of undertakings upon those properties. Cultural resources are evaluated for their significance to be listed on the National Register of Historic Places (NRHP). Significance is determined by applying four basic criteria (USDI 1995):

a. Association with events that have made a significant contribution to the broad patterns of history;
b. Association with the lives of significant persons in the past;
c. Embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguished entity whose components may lack individual distinction;
d. Yielded, or may be likely to yield, information important in history of prehistory.

A historic property evaluated as significant under one or more of these criteria would also possess one or more aspects of integrity: location, design, setting, materials, workmanship, feeling, and association.

Other laws and policies that guide the CFO in the protection of historic properties, sacred sites, and in consultation with tribal groups and other interested parties include:

- National Environmental Policy Act 1969 (NEPA)
- American Indian Religious Freedom Act 1978
- Archaeological Resources Protection Act 1979
- Native American Graves Protection and Repatriation Act 1990
- Executive Orders 13175, 13007, 11593
- Executive Memo, November 5, 2009

Since the NHPA was passed, federal agencies have established their own standards by which they meet their Section 106 responsibilities. The standards for inventory, reporting, records maintenance, data recovery, and permitting for the BLM are found in *Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM Manual Supplement H-8100-1).

The NHPA also encourages federal agencies to establish additional protocols and agreements for managing cultural resources, especially where it would provide streamlined processes for identifying historic properties, determining eligibility, and consulting with the State Historic Preservation Office (SHPO) and other interested parties on repetitive and routine projects with predictable impacts or no impacts at all. The following are additional programs that guide cultural resources management processes in the CFO planning area:

- BLM National Programmatic Agreement, 2012 (with the BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers)
- State Protocol Between the New Mexico Bureau of Land Management and the New Mexico State Historic Preservation Officer Regarding the Manner in which NLM will meet its Responsibilities Under the National Historic Preservation Act in New Mexico, December 2014,
- New Mexico Cultural Resource Information System (the data repository for cultural resources in New Mexico)
- Permian Basin Programmatic Agreement (Permian Basin PA), 2013 (formerly a Memorandum of Agreement, with the CFO, the New Mexico SHPO, the New Mexico Oil and Gas Association, and the Advisory Council on Historic Preservation)
- BLM CFO Standards and Guidelines for Site Recording, 2012 (CFO internal document for use by archaeological contractors)

3.2.8.1 Cultural History

The CFO planning area encompasses a long history of occupation that is customarily divided into four traditions: Paleoindian (11,500–7000 B.C.); Archaic (6000 B.C.–A.D. 500); Formative (A.D. 500–1450) and Post-Formative Native American (A.D. 1450–1870); and Historic Euro-American (A.D. 1870–present). Sites dating from all of these time periods occur in the planning area. The vast majority of sites, however, lack temporally diagnostic artifacts, and thus cannot be confidently assigned to any cultural component. A brief summary of the culture history of the CFO area follows and is drawn from Railey (2012).

The Paleoindian tradition (11,500–7000 B.C.) is represented in the CFO planning area as isolated finds and small artifact scatters, along with a few campsites and larger artifact scatters. People living during this time frame were highly mobile hunters and gatherers who focused on hunting now-extinct big game animals. Few of these sites exist in the planning area, but those that do appear to cluster in areas with reliable water sources like the Pecos River, the Mescalero Escarpment Base, and in far southeastern Lea County near what were probably pluvial lakes. The apparent lack of pit features (such as cooking and storage pits and structure remains) translates into very few contexts where charcoal for radiocarbon dating may be preserved, and indeed there are no Paleoindian radiocarbon dates in the CFO planning area.

The Archaic tradition (6000 B.C.–500 A.D.) is represented as isolated finds, artifact scatters, burned rock concentrations, and pit features. The appearance of pit features (used as hearths, cooking pits, and storage facilities) created "time capsule-like" contexts that have preserved charcoal for radiocarbon dating. Evidence for human occupation in the planning area during the Early Archaic (6000–3200 B.C.) is minimal, which probably reflects low population densities and unfavorable climatic conditions. The Early Archaic was exceptionally dry overall, and during the worst of it humans probably clustered around surviving water sources, perhaps including higher-elevation areas in the western part of the planning area. A broad-spectrum subsistence economy was well-established by the Middle Archaic (3200–1800 B.C.), including the use of seeds and roots that require processing prior to consumption. This is evidenced by biotic remains, ground stone milling tools, cooking pits, and burned rock. The Late Archaic (1800 B.C.–500 A.D.) saw the continuation of mobile hunting and gathering lifeways, but the density of sites increased, indicating population growth under improved climatic conditions.

Native lifeways and site types changed little during the Early Formative period (A.D. 500–1100), but the appearance of ceramics at that time greatly improves the ability to assign sites to this and subsequent periods. The earliest remains of habitation structures appear during this period, and their characteristics suggest expediently made wickiup-like brush huts set in shallow basins, underscoring the continuation of highly mobile lifeways. Village-type settlements appear during the Late Formative period (A.D. 1100–1450), as indicated by sites with abundant artifacts, midden deposits (which accumulated through intensive human occupation), and much more substantial habitation structures than anything seen in previous periods. Unfortunately, many of these "village" sites have been badly looted or were otherwise excavated using pre-modern field methods. Most sites in the planning area still consist of artifact scatters, burned rock concentrations, and/or pit features. A variety of decorated ceramics in the Late Formative period greatly improves chronological resolution.

Villages were abandoned after A.D. 1450 and Native people in the area shifted to a more nomadic way of life. The archaeological signature of Post-Formative Native peoples is thus much lighter and less easily identified than for the Formative periods. Post-Formative site types include artifact scatters (some with burned rock concentrations and pit features), tipi rings, and at least one bison kill. Apache sites in the area appear as early as the 1500s. The Apache were displaced by the Comanche, who were present in southeastern New Mexico by the mid- to late 1700s. Identifiable Apache and Comanche sites are few in the planning area, but include artifact scatters (some with features), camp remains, and battlefield sites.

European and Hispanic settlement of the planning area occurred largely in the late 1800s, following the establishment of forts by the United States military after the Mexican-American War (1846–1848), and the final subjugation of the Comanche and Apache in the 1870s and 80s. Large-scale cattle ranching in New Mexico began in the 1880s. The extermination of the bison coincided with an expansion of cattle ranching efforts in southeastern New Mexico, and ranching dominated the CFO region's agricultural economy during the latter half of the nineteenth century.

Oil was first discovered in Eddy County in 1909. Although Carlsbad was on the far edge of the oil fields, it already had a head start as a trading center and thus naturally became a headquarters for some of the companies and workers in the petroleum industries. Potash was to become a major industry for Eddy County in the mid-1920s. The archaeological expression of oil exploration and extraction and potash mining consists of metal pipelines, casings, habitation remains, a network of in-use and abandoned railroads, mining facilities, and refuse scatters comprising industrial and domestic remains.

3.2.8.2 Current Conditions

Cultural resources derive their significance and eligibility to the NRHP through the physical properties of integrity and through the scientific and historic information potential they might provide about people and processes of the past. TCPs derive their significance to the NRHP and for a traditional community through the physical properties of integrity and the role the property plays in a community's beliefs, customs, and practices. Therefore, the indicators for cultural resources and TCPs are natural and anthropogenic conditions

that would impact or identify those characteristics that contribute to the significance of a historic property and qualify it as eligible to the NRHP, or those that impact the value and meaning of that property to a traditional living community. The following indicators can predict the integrity of cultural resources and TCPs:

- The amount and distribution of vegetative ground cover sufficient to support soil stability and potential buried cultural deposits;
- The amount of past and current commercial development within an area; and
- The amount and adequacy of inventory conducted in an area.

The vast majority of cultural resources inventory in the CFO planning area is driven by Section 106 compliance for the oil and gas industry. As a multiple-use agency, the BLM also authorizes land uses associated with cattle ranching, utility corridors, transportation routes, and recreational activities.

Between the late 1970s and 2012, over 20,000 cultural resource inventories had been conducted and over 12,000 cultural resource sites recorded in the planning area (Railey 2012). These numbers include private property and other federal and state agencies whose lands are encompassed within the greater planning area (see Table S.12 and Table S.13 in Appendix S). For undertakings involving BLM lands and lands of other jurisdictions, the BLM is most often the lead agency. As lead, the BLM is responsible for ensuring compliance with the NHPA occurs for the entire project regardless of land status.

The majority of recorded sites are prehistoric or historic Native American artifact scatters with burned rock, worked lithic material, ceramics, and thermal features with deposits (hearths). The informational level at which most of the sites have been recorded can be characterized as minimal. The standards of survey and recording in the first years of cultural resource management were largely unregulated as the discipline struggled to get established, technology was relatively primitive, and the work was being conducted by many contractors operating by their own standards and level of training. As a result of the boom years of energy exploration, 64% of sites were left as “undetermined” to be evaluated at some future date Twenty-six percent was assigned the category of “eligible under Criterion D, information potential.” These eligibility recommendations of “eligible” and unevaluated or undetermined (treated as eligible) were used primarily on prehistoric artifact scatters, with or without dateable features, effectively placing 90% of sites recorded in the planning area in a protected status. The most expedient method in managing these sites was to redesign the project so as to avoid impacts to the site, which was not evaluated for eligibility. Thus began the programmatic avoidance strategy that has been the norm for cultural resource management in the planning area. While this did protect the site in the short term, it became an ineffective management tool over time as industrial development increased with no corresponding cultural resource management strategy for determining eligibility or corresponding mitigation strategies developed to address the indirect and cumulative effects of oil and gas development.

As BLM policies became more developed, the primary strategy remained avoidance; however, other mitigation options, such as data recovery, have been used. The CFO has also instituted site recording standards (2012), specific to the site types in this area, which require contractors to use subsurface testing to determine the extent of natural deposition and the potential for cultural material, such as dateable charcoal from thermal features.

The CFO cultural resources department reviews more than 1,000 oil and gas–related projects a year. Just over half of these are handled under the Protocol Agreement, which is an alternate procedure for complying with Section 106 and involves pedestrian survey and reporting. The rest are administered through the Permian Basin PA, which is another alternate process for complying with Section 106.

In 2002, the U.S. Department of Energy (DOE) funded the Preferred Upstream Management Processes Grant Program (PUMP) III Project, an investigation of cultural resource adaptive management practices for the oil and gas fields of New Mexico and Wyoming. Several recommendations resulted from this project, including moving away from programmatic avoidance or “flag and avoid,” providing archeological sensitivity information to industry to use in planning decisions, shifting to electronic processing of compliance documentation, and focusing on cultural resources during lease sales and initial plans of development.

The Energy Policy Act of 2005 provided special funding for the creation of Pilot Energy Offices within the BLM. The CFO became one of these offices and was able to begin implementation of many of the PUMP III ideas. In May 2008, the BLM entered into the Permian Basin Memorandum of Agreement, an alternative method to comply with Section 106 of the NHPA. This Memorandum of Agreement was renegotiated with the Section 106 consulting parties in 2008and became a Programmatic Agreement (PA). This process allows industry access to site locations through GIS data, so they can initially plan projects on BLM-administered and private land that will avoid known archeological sites. Industry must sign a confidentiality agreement regarding site locations. The affected area comprises a 1.1-million-acre subsection of the planning area (28 quadrangles) known as the Mescalero Sands, an area heavily used for oil and gas exploration (Map 3-11, Appendix B).

Instead of contracting for a pedestrian survey of the project area, participants contribute a set amount of funds, based on the size and scope of their project, into a BLM account that is used to conduct off-site mitigation. This program allows the CFO to retrieve information from targeted sites that otherwise would remain unknown, either because the natural environment will eventually destroy them or because surficial recordings cannot recover their information potential. The Permian Basin PA is managed by a dedicated staff member of the CFO cultural program and is additionally supported by a consortium of professional archaeologists in the region who review proposed projects and provide program guidance. Projects are put up for bid to companies that have been accepted on the Blanket Purchase Agreement. Successful bidders are chosen by the CFO cultural resources staff through a ratings system provided in technical proposal reviews. The PA has funded 20 major archeological projects (three are currently in progress), plus three small grants projects through the CFO and 4 small grants through the State of NM HPD (Table S.14, Appendix S).

3.2.8.2.1 Public Archaeology and Outreach

The implementation of the Permian Basin PA has significantly enhanced the archaeological knowledge of southeast New Mexico and has provided educational materials for the public. One goal of the BLM and stipulated in the PA is that each research project funded by the Permian Basin PA produce an educational component such as a booklet written for the general public that explains the project and provides an interpretation of the results in plain language. The *Permian Basin Quarterly* is a newsletter published by the CFO that describes current and proposed research and is provided to the oil and gas companies that participate in the program, as well as many other individuals and organizations. Many of the Permian Basin PA projects have been presented at professional conferences and meetings. All projects are published online at https://www.tdar.org (The Digital Archaeological Record).

The CFO also assists in coordinating the local Site Watch groups in Carlsbad and Hobbs. Site Watch is a state-sponsored program of volunteers trained in cultural resource monitoring on public lands. These volunteers assist in historic preservation by monitoring the conditions at sites vulnerable to vandalism, looting, or natural degradation. The groups report on their sites quarterly to the SHPO.

3.2.8.2.2 Trends

The effectiveness and results of the Permian Basin PA are reviewed every 3 years by the SHPO, the New Mexico Oil and Gas Association, and the BLM, and the current PA is in effect until May 2026. The exploration and production of oil and gas in southeast New Mexico is projected to continue and likely increase in the near future. Since 2008, the program has averaged 554 projects for review a year (see Table S.15 in Appendix S for trends since May 2008). The cultural program will continue to promote the Permian Basin PA within the 39 quadrangles and use the mitigation funds for projects that will further archaeological knowledge in this region. As industry more intensely extracts natural resources through closer spacing, large-scale seismic projects, and new technologies and practices, alternative forms of compliance with Section 106 of the NHPA, such as the Permian Basin PA, may become more commonplace.

For areas outside the Permian Basin PA area, the BLM will continue to work with the SHPO and archaeological contractors to refine survey and site recoding methods to improve the results of Section 106 compliance in the planning area. Since 2008 there have been an average of 830 reports submitted for review per year, with an average of 332 new sites and 336 sites updated (Table S.16, Appendix S; see

Table S.15 in Appendix S for trends since May 2008). As this continues, more sites will be initially recorded with enough information to make a determination, and previously recorded sites will be updated with better methods. This will result in more effective management of sites overall. The BLM will also continue to explore better avoidance, minimization, and mitigation methods that will both preserve information for future research and more effectively protect historic properties from the direct, indirect, and cumulative effects or impacts of energy exploration projects.

3.2.9 Paleontological Resources

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or un-mineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only fossils themselves, but also the associated rocks or organic matter and the physical characteristics of the fossils' associated sedimentary matrix. The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced (Murphey and Daitch 2007).

The Paleontological Resources Preservation Act of 2009 (PRPA) is the primary legislative authority for BLM management of paleontological resources. NEPA requires that paleontological resources be addressed as part of the analysis for any proposed action. Additionally, the BLM's Instructional Memorandum (IM) 2016-124 (BLM 2016a), Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands; IM 2009-011 (BLM 2008b), Assessment and Mitigation of Potential Impacts to Paleontological Resources; IM 2009-113, Casual Collecting of Common Invertebrate and Plant Paleontological Resources under the Paleontological Resources Preservation Act of 2009; and the Manual H-8270-1, Paleontological Resource Management (BLM 1998) provide general procedural guidelines for the management of paleontological resources. Management objectives include locating, evaluating, collecting, researching, providing education/interpretation, and protecting paleontological resources, as well as ensuring that proposed land use projects do not inadvertently damage or destroy scientifically important paleontological resources. Although the contents of IM 2009-011 and IM 2009-113 are accurate, the IMs are out of date and their subject matter will be incorporated in a future revision of Manual H-8270-1.

According to BLM's IM 2009-011, Assessment and Mitigation of Potential Impacts to Paleontological Resources (BLM 2008b:1-18–1-19), a significant paleontological resource is defined as:

> Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities.

Fossils are important because they provide information about the relationships of living and extinct organisms, their evolution, and their distribution. Progressive changes seen in fossil lineages provide critical information on the evolutionary process and the ways that new species arise and organisms adapt or fail to adapt to changing environmental circumstances. Fossils also serve as important guides to the ages of the rocks in which they are found. They are useful in determining the temporal relationships of rock units from one area to another and in identifying the timing of geologic events. Time scales established by fossils provide chronological frameworks for geologic studies of all kinds. Fossils can also provide clues regarding the depositional environments of the sedimentary rocks in which they are preserved, can be important indicators of ancient climates, and can help document climatic change.

Occurrences of paleontological resources are closely related to the geologic units in which they are contained, and the potential for finding scientifically important paleontological resources can be broadly predicted by the presence of the pertinent geologic units at or near the surface. Therefore, geologic mapping can be used as a proxy for assessing the potential for occurrences of important paleontological resources. The BLM has evaluated the geologic units within the planning area and classified them according to the Potential Fossil Yield Classification (PFYC) system (BLM 2016a). Map 3-12 in Appendix B depicts the general locations for the PFYC. This system ranks the geologic units from very low (PFYC Class 1) to very high (PFYC Class 5) sensitivity (see Table S.17 in Appendix S) and uses geologic mapping as a predictive tool to identify areas of paleontological sensitivity (there are also classes for geologic units with unknown potential, water, and ice). This classification does not reflect rare or isolated occurrences of significant fossils or individual localities, only the relative occurrence on a formation- or member-wide basis. Any rare occurrences require additional assessment and mitigation if they fall within the area of anticipated impacts.

3.2.9.1 Current Condition

The following is a discussion of the paleontology and contextual geology of the planning area. Table S.18 in Appendix S summarizes the 24 mapped geologic units within the planning area and their associated PFYC.

Paleozoic units within the planning area are limited to middle Permian-age (~258 million years ago) sedimentary rocks including limestones, dolomites, and evaporites exposed primarily in the Guadalupe Mountains and Pecos River valley. These units were deposited in three facies, the Delaware Basin in the east represented by the Bell Canyon, Castile, Salado, and Rustler Formations; the reef and forereef represented by the Capitan Formation; and the backreef (Northwest Shelf) represented by the older Yeso and San Andres Formations as well as the Artesia Group including the Grayburg, Queen, Seven Rivers, Yates, and Tansill Formations (Hill 1987). While all of the Permian-age geologic units within the planning area produce invertebrate fossils they are, except for the Capitan and San Andres Formations, considered to have low paleontological sensitivity (PFYC Class 2) due to the low abundance of fossil localities. The limestone outcrops of the Capitan Formation (PFYC Class 3) contain fossil algae and abundant barrier reef complex invertebrates including sponges, gastropods, bivalves, cephalopods, brachiopods, crinoids, and corals (Fagerstrom and Weidlich 1999). The San Andres Formation has also produced a high number of invertebrate taxa including trilobites, brachiopods, sponges, and nautiloids (Kues and Lucas 1989), as well as a fish tooth plate (Fracasso and Hovorka 1987). The Artesia Group (PFYC Class 2) represents sediments deposited behind the reef in lagoon environments where diversity and number of invertebrates decreases; invertebrate fossils are known from some of these units. This Permian-age package of rocks is highly important in that it likely represents the most studied “reef” complex known and because alluvial processes, dissolution of subsurface evaporates, and resulting collapse structures have locally exposed Cretaceous, Miocene, and younger sediments and created subsurface voids or caves where younger fossils are concentrated.

There are isolated exposures of Triassic (240 million years ago) sedimentary rocks exposed in the northeastern portion of the planning area. Lucas and Anderson (1993a) suggested that Triassic sediments may not occur to the extent implied by previous geologic mapping which may have exaggerated the limits of these units. Known exposures are limited to the Santa Rosa Formation (PFYC Class 3) around the Maroon Cliffs and at Paduca Breaks, and the San Pedro Arroyo Formation at Custer Mountain (Lucas and Anderson 1993a, 1993b). While fossils other than unidentifiable fragments of petrified wood, bone, and coprolites from the Santa Rosa Formation have not been documented, in Triassic deposits in southeastern New Mexico, a high number of important vertebrate fossil localities of this age are known from northern New Mexico and western Texas (Lucas and Anderson 1993a).

The undifferentiated lower Cretaceous rocks include the moderately fossiliferous early late Albian Tucumcari Shale (PFYC Class 3). A locality to the north of the planning area in Quay County, as well as localities in Texas, has provided information about the deposition and environment of this unit. While the near shore fossils including foraminifera, corals, annelids, bryozoans, bivalves, gastropods, scaphopods, ammonites, echinoids, and fish from the Quay locality have received more attention in scientific publications, fossils are also known from units representing deep water environments (Kues 1997; Kues and Lucas 2001).

The Pliocene to Miocene-age (3–10 million years ago) Ogallala Formation (PFYC Class 3) caps the Llano Estacado and occurs locally in eroded or sunken areas in the Pecos River valley and Guadalupe Mountains. Although no fossils have been found within the planning area to date, the Ogallala Formation has produced fish fossils (Hunt and Santucci 2001; Hunt et al. 2006) and Clarendonian-age mammalian fossils (Tedford et al. 2004) from correlative exposures in Texas, as well as mammalian trackways representing at least four taxa (large camel, artiodactyl, felid and canid carnivores) from localities in Chaves County, New Mexico (Williamson and Lucas 1996).

The Pleistocene fossil vertebrate faunas within the planning area can be separate into two categories: cave and open/stratified (Morgan and Lucas 2006). Eleven cave faunas where Permian-age limestone, dolomite, and evaporite deposits have eroded are known from the planning area within the Guadalupe Mountains. Four of these fossiliferous caves (Carlsbad Cavern, Lechuguilla, Muskox, and Slaughter) are located within Carlsbad Caverns National Park, while the other seven lie outside the National Park (Burnet, Hermit's, Omega, Algerita Blossom, Big Manhole, Dark Canyon, and Dry Cave). These cave deposits have yielded a diverse assemblage include over 200 species of reptiles, birds, and mammals (summarized in Morgan and Lucas 2006). There are at least 11 open/stratified faunas that have been documented within the planning area that represents a range of environments including lacustrine "Midland Marl" sediments, spring deposits, sand, and gravel associated with the Pecos, Black, and Delaware Rivers (Morgan and Lucas 2006). Taxa that are representative of these open/stratified faunas include numerous mammals such as mammoth (i.e., the Renn Mammoth), mastodon, bison, and horse, as well as an emydid turtle and gastropods (summarized in Morgan and Lucas 2006). In the eastern portion of the planning area, Late Pleistocene spring and pond deposits of the Tahoka Formation (unmapped at the state scale) have produced mammalian bone fragments and aquatic land snails (Hall 2001) and Pleistocene horse, camel, and bison have been collected from exposures of this formation within the planning area (New Mexico Museum of Natural History and Science unpublished data. With the exception of unmapped cave deposits (PFYC Class 4), Quaternary-age geologic units in the planning area are classified as PFYC Class 2 because they are only locally fossiliferous and represent geologic units that are not differentiated on readily available geologic maps.

Within the planning area, PFYC Class 2 geologic units comprise approximately 3,804,055 acres, and Class 3 geologic units comprise approximately 2,444,868 acres, including all ownership types. PFYC Class 4 geologic units comprise only 8,084 acres of the planning area. Currently, no PFYC Class 5 units have been identified within the planning area (Table 3-8).

Table 3-8. Potential Fossil Yield Classification Acres

	Class 2	Class 3	Class 4
PFYC CFO planning area	3,804,055.01	2,444,867.83	8,083.65
PFYC BLM-administered surface	1,696,814.96	388,874.93	5,758.26
PFYC BLM-administered federal mineral estate	2,229,201.18	673,801.47	6,624.00

3.2.9.2 Trends

Fossil-rich formations found within the planning area have been and continue to be visited by researchers and educational institutions. Cave resources and surface exposures can provide data that are useful for studies of climate change.

Another important trend in management is the application of GIS in land use decisions. The PFYC model is an application of GIS that is based on existing geological maps. Currently, the PFYC map for New Mexico is at a 1:500,000 scale. To be more accurate and useful a 1:100,000 scale PFYC map would be ideal; however, geologic maps at this scale are currently not available for the CFO planning area. As more accurate geologic maps become available, they will be incorporated into the New Mexico statewide PFYC map.

The BLM also maintains a fossil locality data-sharing partnership with the New Mexico Museum of Natural History and Science that is important for updating PFYC values and providing specific locality information. These data, along with other GIS layers, can be used internally to make informed land use decisions.

3.2.9.3 Key Features

Generally, exposures of bedrock often found along canyon walls and cliff faces commonly produce paleontological resources. These include unmapped exposures of Pliocene-, Miocene-, Triassic-, Cretaceous-, and Permian-age sedimentary rocks with thin soil veneers that may be exposed as erosional remnants. In addition, where thin soils cover older sedimentary rocks, surface disturbance may encounter fossil-bearing units.

Key features within the western portion of the planning area, within the Guadalupe Mountains, include Permian limestone units that contain diverse assemblages of invertebrates and caves within these units that contain Pleistocene-age vertebrate fossils. Within the Pecos River valley, key features are the known Pleistocene-age vertebrate localities and the possibility of future new discoveries in similar units. To the east, within the eolian Mescalero Plain area are Pleistocene-age spring and pond deposits, as well as older sedimentary units (Triassic, Cretaceous, and Miocene) exposed in large blowouts and along some stream banks in the eastern half of the sand sheet that may prove to be fossiliferous. The Southern High Plains-Llano Estacado, at the eastern edge of the planning area, contains bedrock is known to be fossiliferous elsewhere and if exposed creates an opportunity for new and important paleontological resources.

3.2.10 Lands with Wilderness Characteristics

BLM Manual 6320 establishes the procedures for considering lands with wilderness characteristics in land use planning:

> When such lands are present, the BLM examines options for managing these lands and determines the most appropriate land use allocations for them. Outcomes of this process include the following:
>
> 1. emphasizing other multiple uses as a priority over protecting wilderness characteristics;
> 2. emphasizing other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics; and
> 3. the protection of wilderness characteristics as a priority over other multiple uses.

One of the key characteristic of lands meeting the qualities of wilderness is the requirement under the Wilderness Act that the parcels of land contain at least 5,000 contiguous roadless acres or be of sufficient size to allow for its preservation and use in an unimpaired condition. BLM Manual 6310 requires the areas being evaluated to be at least 5,000 acres in size, contiguous to other protected lands with wilderness character, of sufficient size to be able to preserve and use in an unimpaired condition, or a roadless island. The other two major criteria in evaluating wilderness character are the 'naturalness' of an area and opportunities for 'solitude and primitive/unconfined recreation'. These terms are defined in BLM Manual 6310, which also describes how to assess these conditions on parcels.

Another component of lands with wilderness characteristics is that those lands may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value, also known as supplemental values. While supplemental values are not required in the BLM's policy on wilderness characteristics, these values are of particular importance and reflect the character of the area. For example, some areas in the CFO planning area may show wilderness characteristics by meeting the above definitions for size, naturalness, and solitude and primitive/unconfined recreation, but also provide historical value to others by preserving Native American ruins or rock art.

3.2.10.1 Current Condition

Wilderness characteristic resources in the planning area were inventoried using the BLM Wilderness Inventory Handbook (BLM 1978a) in 1978 and 1979 and were updated for lands acquired by the federal government between 1986 and 1994. Areas identified as possessing wilderness characteristics in 1979

were designated as WSAs and are currently being managed under Manual 6330 – Management of Wilderness Study Areas (BLM 2012b) until Congress either designates these WSAs as wilderness or releases them from further study. Please see Section 3.5 Special Designations for additional information related to WSAs.

The BLM is required to keep a current inventory on all resources on public lands, including lands with wilderness characteristics. Thus, the CFO will analyze and inventory lands with wilderness characteristics inventory as part of the revision for the Carlsbad RMP.

3.2.10.2 Current Management

The 1988 Carlsbad RMP and following amendments did not address any management actions for lands with wilderness characteristics in the planning area. Lands with wilderness characteristics will be inventoried and analyzed for land use planning according to BLM policy.

3.2.10.3 Management Opportunities

The BLM is directed through FLPMA Section 201 to inventory public land resources and other values, including wilderness characteristics. Wilderness characteristics must be considered in land use planning when the BLM determines those characteristics are reasonably present. Should the CFO identify lands with wilderness characteristics, the RMP revision would analyze a range of alternatives protecting or not protecting those lands based on a variety of factors such as competing land uses, public demands, and manageability.

3.2.10.4 Inventoried Units

As part of the planning effort for the Carlsbad RMP revisions, the BLM re-evaluated public lands within the CFO planning area. Initial determination of lands included an evaluation of lands via aerial images and GIS shapefiles of roads and structures to identify parcels that initially met the size qualifications for lands with wilderness characteristics. All roads outside known constructed roads were validated during the field inventory. Identified parcels were then field verified to determine whether parcels also contained naturalness, opportunities for solitude, opportunities for primitive recreation, and any supplemental values. The Lands with Wilderness Characteristics section in Appendix S outlines the identified parcels that met the inventory criteria and were found to have wilderness characteristics and a summary of their field evaluations. In total, eight units and 55,025 acres are identified within the planning area. Maps 2-3 through 2-6 depict the units considered for protection under at least one action alternative in Chapter 2.

Wilderness characteristics inventories were received from citizen groups. The BLM evaluated the citizen submitted inventories for the presence or absence of wilderness characteristics which included comparison of existing data with the submitted information and field verification in the proposed areas. Through this process the BLM determined whether the submitted areas qualified as lands with wilderness characteristics. The resulting lands with wilderness evaluation forms can be reviewed by contacting the CFO.

3.2.11 Visual Resources

The BLM-administered lands in the planning area encompass a wide variety of far-ranging scenic areas (including natural waterways and massive geological formations), a diversity of industrial uses, developed communities, and rural ranches. The visual resources within the CFO range from mountainous, forested, highly scenic landscapes in the west to areas with flat, relatively featureless plains of low scenic value in the east. Between these extremes lie a diversity of scenically interesting and attractive regions and geologic features, such as rocky escarpments and sand dunes, waterways, caves, lakes and reservoirs, scenic byways, and cultural sites. The CFO is entrusted with the care of these scenic landscapes and scenic byways and with ensuring that scenic values are considered before permitting uses that might have impacts on visual resources.

The BLM uses a Visual Resource Management (VRM) system to manage and analyze potential impacts on visual resources. The VRM system gives BLM planners direction and guidance in identifying and evaluating scenic values to determine the appropriate levels of management (BLM 1984). The VRM system also includes methods and procedures for analyzing potential impacts to visual resources that could be caused by proposed projects and planning efforts, and suggests appropriate visual design techniques to ensure that surface-disturbing activities are visually reduced or not obviously visible. Under the current 1988 Carlsbad RMP, a visual inventory was conducted and VRM classes were designated for all BLM-administered areas within the CFO planning area. These VRM class designations have specific management objectives and specify the degree of permitted changes to the existing visual quality or visual values within a landscape. Changes to the landscape (and the changes to visual resources) are usually caused by (but not limited to) surface-disturbing activities such as oil and gas development, road or trail construction, mining, irrigation, and building construction. The objectives for each of the designated VRM classes, with the range of permitted visual resource changes are in the Visual Resources section of Appendix S.

In general, areas designated as VRM Class I and II in the planning area are those rated as having very high and high scenic quality (as determined through the visual resource inventory process; see the Visual Resources Inventory section below for a detailed description of this process). These high VRM class ratings are the product of an area's unusual and interesting features, topography, rock formations, diversity of color and vegetation, rarity, water features, and high visibility. Visual sensitivity is also a factor in the rating, which is the degree of public interest and concern for an area's visual resources, the level of use that the area receives, and the types of visitors that the area receives BLM 1986b). Areas designated as VRM Class III and IV have moderate to low scenic quality ratings and are also determined through the same VRM inventory process and using the same ratings criteria.

3.2.11.1 Visual Resources Inventory

The BLM typically conducts a visual resources inventory early in the RMP process. The visual resource inventory process is a systematic and consistently applied method that ensures that the current state of scenic quality and visual values are used in developing the action alternatives on CFO visual resources. It is also used by the CFO as it makes land management decisions during this RMP planning process. The inventory begins with the BLM dividing the entire CFO into Scenic Quality Rating Units (SQRUs). These units are areas where the landscape, topography, colors, textures, and other scenic characteristics are similar. For example, one SQRU might encompass an area that is heavily forested, mountainous, and undeveloped; another SQRU might enclose an area that is flat, relatively developed with visible human-made structures, and has unobstructed views in all directions. Within the CFO SQRUs the BLM assigns observation survey viewpoints. These points are chosen based on the ability of a viewer/surveyor to see the unit's representative scenic values. Next, a survey team visits each of the SQRU survey viewpoints and evaluates the scenic quality visible from each viewpoint. Scenic quality is numerically rated at each survey viewpoint using specific factors that include the diversity of visible landforms, the presence of water, vegetation density and diversity, the range of visible colors in the landscape, the visibility of human-made structures, and how rare the view is within the CFO. These numerical ratings are then combined and averaged to rate the scenic quality within each SQRU.

Once scenic quality has been determined within the CFO, two other major elements are considered (and numerically rated) by the BLM as part of the inventory process: visual sensitivity and distance zones. Visual sensitivity, as mentioned above, is the degree or level of public concern for an area's scenic quality. Sensitivity is also numerically rated using factors that include the type of user of the landscape, the degree of public use, the level of public interest in the landscape, special recreation or preservation areas within the landscape, and adjacent land uses. Distance zones are defined as 1) foreground-middleground (landscapes seen from highways and other travel routes, rivers, and viewpoints that are less than 3 to 5 miles distant), 2) background (landscapes seen from approximately 5 to 15 miles in the distance), and 3) seldom-seen (landscapes mostly hidden from view).

Finally, once all of the inventory elements of scenic quality, visual sensitivity, and distance zones within the CFO have been determined, they are overlaid onto a digital map using computer software that combines them to produce a final visual inventory rating. The final ratings for each SQRU are called Visual Resource

Inventory Classes (VRI classes). The VRI Class I is assigned to areas where previous management decisions have been made to preserve or maintain a natural landscape. The lower VRI Classes II, III, and IV are informational only, and are used for considering visual values during the RMP process.

The acreages derived from the visual resource inventory are used during the RMP process, along with other resource management considerations (balancing the needs of other resources and planning area activities), to create a range of proposed VRM class acreages for each alternative. Therefore, the proposed VRM classes for each action alternative are the result of a synthesis or balance of other proposed resource and land management actions. For example, the need to preserve the visual resource values determined by the inventory and classified under the Visual Resource Inventory (VRI) classes are considered, along with the need to develop oil and gas resources, the need to protect wildlife habitat and water quality, the need to permit utility power line ROWs, and the need to maintain conditions for livestock grazing.

VRI classes differ from VRM classes. VRM classes are land use planning decisions on the management of the visual resource inventory and do not represent the scenic quality, whereas VRI classes are assigned through the inventory process and represent levels of scenic quality, sensitivity for the scenic quality, and distance zones. While VRI classes are indicators of scenic value, VRM classes are designation decisions on level of management protection as described in the VRM class objectives (VRM Class I–IV listed above). Refer to Maps 3-13 and 3.14 in Appendix B to see the results of the inventory process (the CFO Visual Resource Inventory) and current planning area VRM class designations.

3.2.11.2 Current Condition

In November 2011, a VRM inventory was conducted for the planning area. The inventory was conducted because it was necessary for BLM planners in the CFO to know the changes and modifications to the resource (see the Trends subsection below) that have occurred since the prior visual inventory (conducted in 1978–1979) and since approval of the current 1988 RMP. Table 3-9 depicts the acreages for each VRI Class as determined by the recent inventory.

Table 3-9. VRI Class Acreages (BLM lands only)

VRI Class I	VRI Class II	VRI Class III	VRI Class IV	Total Acreage
7,001	**66,414**	**185,878**	**2,524,131**	2,783,424

Source: SWCA Environmental Consultants 2011.

3.2.11.3 Trends

At present, the visual landscape is being modified by industrial development and agricultural growth. Fluid mineral extraction (oil and natural gas), including associated infrastructures, alternative energy development such as wind and solar energy, and potash mining operations, are other modifiers of the landscape on BLM-administered lands and adjacent private lands. Buffers around landscapes with higher scenic quality may be insufficient or non-attainable. The lack of buffers around scenic landscapes allows major surface-disturbing activities in or adjacent to areas, creating conflicts with visual resource planning objectives. The impacts to scenic vistas and natural settings could continue to increase because of multiple resource uses on public lands and from activities on adjacent state or private lands. Growing pressure is being placed on visual resources because of activities such as oil and gas production, potash mining, wind energy proposals, wildland fire, recreation, land use authorizations (e.g., utility corridors, communication sites, and road and trail development for authorizations), and livestock grazing management (e.g., pipelines, roads for herding and trailing livestock, and water tanks). Locations within the CFO planning area that are currently pristine and undeveloped could eventually be impacted by oil and natural gas pump jacks, tank batteries, pad scars, pipelines, water lines, open pit reservoirs, power lines, roads, utility corridors, and OHV trails.

A comparison of the 1988 RMP with the latest 2011 VRM inventory substantiates the trend toward loss of scenic quality and visual values within the planning area. The inventory data show that approximately 75% (4,621,150 acres) of all lands within the planning area have been modified by human-made activities. Scenic quality Class B lands (lands with moderate scenic quality) within the BLM-managed areas of the

planning area have been downgraded from 27% to only 6% of the planning area, so 21% of former Class B scenic quality areas have been downgraded to Class C (lands with low scenic quality). The trend for visual resources within the planning area is shifting toward a scarcity of scenic quality and toward putting the remaining 25% of intact visual resources within the planning area at risk (BLM 1988; SWCA Environmental Consultants 2011).

Assuming that the existing trend within the planning area continues as an increase in oil and gas development, potash mining, caliche mining, commercial and agricultural development, wind/solar potential, and motorized recreational use, the impacts to visual resources would continue. Changes in recreational use, resource use conflicts, human population, and the shifting boundaries between urban areas and wildlife habitat would be contributing factors to future changes in VRM class ratings of planning area visual resources.

3.2.11.4 Key Features

The major areas within the planning area that possess both outstanding to high scenic quality and high visual sensitivity are the Guadalupe Escarpment Scenic Area, Cottonwood Day Use Area, Pecos River Corridor, Shugart Dunes, Livingston Ridge, Maroon Cliffs, and Guadalupe Backcountry Byway. Adjacent lands with high sensitivity for scenic resources include Carlsbad Caverns National Park, Guadalupe Mountains National Park, Living Desert State Park, Brantley Lake State Park, and Lincoln National Forest.

The areas within the BLM-administered portions of the planning area that possess both outstanding to high scenic quality and high visual sensitivity are shown in Table 3-10. These areas were designated with VRM Class ratings under the 1988 RMP.

Table 3-10. Existing Visual Resource Management Ratings within the Planning Area

Current VRM Ratings for Key Scenic Areas	Areas
VRM Class I	Lonesome Ridge WSA, Mudgetts WSA
VRM Class II	Guadalupe Escarpment Scenic Area (Zone 1), cave management units, Pecos River Corridor Special Recreation Management Area (SRMA), Dark Canyon Scenic Area and ACEC, Pecos River Canyon Complex ACEC, Seven Rivers Hills area, and dispersed areas not included in the recreation SMAs
VRM Class III	Guadalupe Escarpment Scenic Area (not in Zone 1), Dark Canyon SMA, and disperse areas not included in the SMAs
VRM Class IV	Any remaining areas within the planning area not included in the above VRM Class designation

3.2.12 Air Resources

3.2.12.1 Air Quality

3.2.12.1.1 Regulatory Requirements

National Ambient Air Quality Standards

The EPA established national ambient air quality standards (NAAQS) for six pollutants known as “criteria” pollutants. They are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), sulfur dioxide (SO_2), fine particulates with a nominal aerodynamic diameter of 10 micrometers or less (PM_{10}), and fine particulates with a nominal aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$) (40 CFR 50.1–50.17). The primary standards for the criteria pollutants are health-based standards. They are set at levels to protect the health of the most sensitive individuals in the population: the very young, the very old, and those with respiratory problems or other ailments. The EPA also established secondary standards for the criteria pollutants. These are the quality of life standards that are the same as the primary standards or less stringent than the primary standards. All of the standards are expressed as concentration and duration of

exposure, and most address both short- and long-term exposure. New Mexico has established ambient air quality standards (NMAAQS) for the same pollutants and standards for hydrogen sulfide (H_2S), total reduced sulfur, and total suspended particulate (TSP) (20.2.3 NMAC).

The NAAQS and NMAAQS for the pollutants are presented in Table S.19 in Appendix S.

When a designated air quality area or airshed within a state violates a NAAQS, that area may be designated as a "non-attainment" area. Areas with levels of a criteria pollutant below the health-based standard are designated as "attainment areas." It is possible for a geographic area to be an attainment area for one criteria pollutant, but a non-attainment area for another. To determine whether an area meets the NAAQS, air-monitoring networks have been established and are used to measure ambient air quality. Monitoring sites, by design, are located in areas where high concentrations within a region are expected to occur. There are NO_2, O_3, and $PM_{2.5}$ monitors in both Carlsbad and Hobbs, New Mexico, and an ozone monitor in Carlsbad Caverns National Park. The CFO planning area is an attainment area with respect to the NAAQS and complies with New Mexico State Standards.

Air Quality and Human Health

Air pollution poses known risks to human health. The EPA regulates criteria air pollutants and hazardous (or toxic) air pollutants because they are considered harmful to public health and the environment at concentrations above established standards.

Of the six criteria pollutants, particulate matter and O_3 present the most widespread health risks. Studies have linked exposure to particulate matter to health problems such as irritation of the airways, coughing, difficulty breathing, reduced lung function, aggravated asthma, chronic bronchitis, irregular heartbeat, non-fatal heart attacks, and some cancers (EPA 2014a). Research has found that certain populations are more vulnerable to these health effects, such as people with pre-existing heart or lung diseases, children, and older adults. Research has also confirmed links between exposure to $PM_{2.5}$ and increases in respiratory health problems, hospitalizations, and premature death (EPA 2014a).

Atmospheric particulate matter comprises many different chemical components that vary by location and time. Further, fine- and coarse-fraction particulate matter particles have fundamentally different sources and composition. Based on studies conducted in most parts of the United States, sulfate, ammonium, and hydrogen ions; elemental carbon, secondary organic compounds, and primary organic species from cooking and combustion; and certain metals, primarily from combustion processes, are found predominately in fine particles of ambient particulate matter (EPA 2005). Crustal-related materials such as calcium, aluminum, silicon, magnesium, and iron, and primary organic materials such as pollen, spores, and plant and animal debris are found predominately in coarse particles of ambient particulate matter. Some components, such as potassium and nitrate, may be found in both fine and coarse particles (EPA 2005). Many particulate matter components can be linked with differing health effects, but the evidence is not yet sufficient to allow differentiation of those components that are more closely related to specific health outcomes (EPA 2012a). Therefore, health effects due to specific components of particulate matter cannot be separated out at this time.

Breathing O_3 can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level O_3 also can reduce lung function and inflame the linings of the lungs. Repeated exposure to O_3 may permanently scar lung tissue (EPA 2014b).

Exposure to CO can cause harmful health effects by reducing oxygen delivery to the body's organs and tissues. At extremely high levels, CO can cause death (EPA 2015c). Current scientific evidence links short-term NO_2 exposures (ranging from 30 minutes to 24 hours) with adverse respiratory effects such as airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term NO_2 concentrations with increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma (EPA 2014b). Current scientific evidence links short-term exposures to SO_2 (ranging from 5 minutes to 24 hours) with adverse respiratory effects, including bronchoconstriction and increased asthma symptoms. Studies also

show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations such as children, the elderly, and asthmatics (EPA 2015d).

Depending on the level of exposure, Pb can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and the cardiovascular system. Pb exposure also affects the oxygen carrying capacity of the blood. Infants and young children are especially sensitive to even low levels of Pb, which may contribute to behavioral problems, learning deficits, and lowered IQ (EPA 2014e).

With regard to hazardous air pollutants (HAPs), people exposed at sufficient concentrations and durations may have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory, and other health problems (EPA 2012f).

Because NAAQS are the legal guidelines that have been established to protect human health and the environment for criteria air pollutants, the air quality analysis in Chapter 4 examines compliance with the NAAQS. Action alternatives that are compliant with the NAAQS are assumed to be protective of human health and the environment. HAP emissions have been compared with known health exposure levels (from the EPA's Integrated Risk Information System) to provide an assessment of potential impacts on human health.

Class I Areas and Class II Areas

Clean air designations were established under the federal Clean Air Act (CAA) Title I, Part C, Prevention of Significant Deterioration (PSD) of Air Quality. Generally, the Class I air quality and land use classification is the designation for clean, pristine airsheds and would permit little or no development, and the Class II designation is applied to all other clean airsheds (in attainment of the NAAQS) where development is permitted under state authority. Class I areas include national parks larger than 6,000 acres, national wilderness areas larger than 5,000 acres, and international parks and national memorial parks larger than 5,000 acres. Except for fires and wind erosion, the only potential for adverse air quality impacts in Class I areas is from anthropogenic pollutants transported into these areas by large-scale winds, local winds, or both.

The area within the CFO boundary is designated as a Class II area for the criteria pollutants with the exception of Carlsbad Caverns National Park, which is designated as a Class I area and is located in Eddy County.

Prevention of Significant Deterioration

In addition to the NAAQS discussed above, the EPA promulgated PSD regulations to further protect and enhance air quality. The PSD regulations use an incremental approach and are intended to help maintain good air quality in areas that attain the national standards and to provide special protections for national parks. These increments establish the maximum increase in pollutant concentration allowed above a baseline level. Complete consumption of an increment would impose a restriction to growth for the affected area. It does not necessarily indicate an adverse health impact. PSD permits are required for major, new stationary sources of emissions that emit 250 tons (100 tons for some specific sources) or more per year of a criteria air pollutant where the source is located in an attainment or unclassifiable area. Increment consumption for major sources is tracked by the State of New Mexico as permits are issued. Class I and Class II increments have been established for PM_{10}, $PM_{2.5}$, SO_2, and NO_2. The maximum allowable PSD increments over baseline are shown in Table S.19 in Appendix S. Air quality cannot deteriorate beyond the concentration allowed by the applicable NAAQS, even if not all of the PSD increment is consumed.

General Conformity

To eliminate or reduce the severity and number of NAAQS violations in non-attainment areas, and to achieve expeditious attainment of the NAAQS, the EPA promulgated the Conformity Rule (40 CFR 6, 51, 93). The Conformity Rule applies to federal actions and environmental analyses in non-attainment and maintenance areas completed after March 15, 1994. This rule contains a variety of substantive and procedural requirements to show conformance with both the NAAQS and state implementation plans.

Section 176(c) of the CAA prohibits federal agencies from taking actions in non-attainment and maintenance areas unless the emissions from the actions conform to the state implementation plan or tribal implementation plan for the area. Federal actions must be evaluated for conformity to the local state implementation plan if the project 1) is located within an EPA-designated non-attainment or maintenance area, 2) would result in emissions above major source threshold quantities of criteria pollutants, 3) is not a listed exempt action, and 4) has not been accounted for in an EPA-approved state implementation plan.

The area within the CFO boundary is classified as attainment for all criteria pollutants and therefore is exempt from a general conformity analysis. Non-attainment areas in New Mexico outside the CFO boundary are as follows (New Mexico Air Quality Bureau 2013):

- O_3 Maintenance Area in Sunland Park (located west of the CFO planning area, south of Las Cruces): The EPA designated this area as a marginal non-attainment area for O_3 in July 1995. The nearby urban areas of El Paso, Texas, and Ciudad Juarez, Mexico, are suspected of being the source of much of the air pollution in this area. Due to the revocation of the 1-hour O_3 standard by the EPA in 2004, Sunland Park was re-designated to maintenance status for the 8-hour O_3 standard. The maintenance area is bounded by the New Mexico–Texas state line on the east, the New Mexico–Mexico international line on the south, the Range 3 East–Range 2 East line on the west, and the N3200 latitude line on the north. In Carlsbad, removing the effects of weather, ozone concentrations increased 8% between 2000 and 2012 (BLM 2016b).
- PM_{10} Non-attainment Area in Anthony (located west of the CFO planning area, south of Las Cruces): The State of New Mexico submitted the Anthony PM_{10} state implementation plan to the regional EPA headquarters on November 8, 1991. The non-attainment area is bounded by Anthony Quadrangle, Anthony, New Mexico - Texas. SE/4 La Mesa 15-minute Quadrangle, N32 00 - W106 30/7.5, Sections 35 and 36, Township 26 South, Range 3 East as limited by the New Mexico–Texas state line on the south. A maintenance plan has not been developed at this time. The site is located in Doña Ana County, which submitted a Natural Events Action Plan for PM_{10} exceedances to the EPA in December 2000. The EPA has not re-designated the state's PM_{10} non-attainment area at this time, nor has it indicated any plans to do so.
- SO_2 Maintenance Area in Grant County (located west of the CFO planning area, at the Arizona border): This maintenance area is located at the Phelps Dodge Chino Copper Smelter in Grant County. The maintenance area is defined as a 3.5-mile-radius region around the smelter. The maintenance area also includes high elevation areas within an 8-mile radius. The state submitted a state implementation plan to the regional EPA headquarters in August 1978. The New Mexico Air Quality Bureau submitted a re-designation plan to the EPA in February 2003. The re-designation plan was approved by the EPA in September 2003.
- The Doña Ana County Natural Events Action Plan for PM_{10} (located west of the CFO planning area, at the Mexican border and includes Las Cruces): In December 2000, the New Mexico Air Quality Bureau submitted a Natural Events Action Plan for Doña Ana County. The EPA would excuse those PM_{10} exceedances caused by uncontrollable natural events if adequate dust control plans are in place. For Doña Ana County, getting these exceedances excused would keep the area from being designated non-attainment.
- Luna County Natural Events Action Plan for PM_{10} (located west of the CFO planning area, at the Mexican border): In October 2004, the New Mexico Air Quality Bureau submitted a Natural Events Action Plan for Luna County. The EPA would excuse those PM_{10} exceedances caused by uncontrollable natural events if adequate dust control plans are in place. For Luna County, getting these exceedances excused would keep the area from being designated non-attainment.

Air Quality–related Values

Federal land managers have identified air quality–related values (AQRVs) to be protected in federal areas such as national parks and national forest Class I areas. AQRVs are scenic, cultural, physical, biological, ecological, or recreational resources that may be affected by a change in air quality, as defined by the federal land manager. Specific AQRVs of concern are dependent on a number of variables, including the evolving state of the science, project-specific pollutants, site-specific management concerns, and the existing condition of the AQRVs.

A threshold exceedance does not mean the federal land manager would find that a project would adversely affect AQRVs (FLAG 2010). A threshold exceedance of an AQRV means that an adverse impact could occur. Screening thresholds exceedances must be evaluated within the greater context specific to the Class I area analyzed. Facts to be considered include the current pollutant concentrations and trends, future emission changes likely to occur, the expected life of the source, the stringency of emission limits proposed, and other ancillary environmental benefits that could result to AQRVs from the source. Refer to Current Condition sections (below) for a discussion of specific AQRVs: visibility, acid deposition, and flora and fauna.

3.2.12.1.2 Current Condition

Sources within the Carlsbad Field Office Boundary and Background Air Quality

Locations vulnerable to decreasing air quality include areas adjacent to surface-disturbing activities, such as energy and mineral development projects, farm tilling, and local population centers affected by residential and mobile emissions.

The types of sources included in an emission inventory include:

1. Point: large, stationary (non-mobile), identifiable source of emissions that release pollutants to the atmosphere. In all, 49 of the 232 point sources listed in Appendix E are major for one or more pollutants (i.e., greater than 100 tons/year). Of these sources, 32 are PSD sources (i.e., greater than 250 tons/year).
2. Area: collectively represent point sources that have not been inventoried as a specific point, mobile, or biogenic source. They are typically sources that are too small, numerous, or difficult to inventory individually.
3. Mobile: motor vehicle, non-road engine, or non-road vehicle; major roads within the CFO boundary include U.S. Highways 82, 285, and 62.
    - Motor vehicle: self-propelled, used to carry people or property on a street or highway;
    - Non-road engine: internal combustion engine (including fuel system) that is not used in a motor vehicle, a vehicle used only for competition, or affected by Sections 111 or 202 of the CAA; and
    - Non-road vehicle: vehicle that is run by a non-road engine and does not meet the qualities above.
4. Biogenic: all pollutants emitted from non-anthropogenic sources; for example, trees, vegetation, oil and gas seeps, and microbial activity.

In 2011, an emission inventory for calendar year 2007 was developed for Chaves, Eddy and Lea Counties (Applied EnviroSolutions 2011). A summary of this inventory is presented below. The point source category in Table 3-11 represents facilities that have been issued an air pollution permit. The data were not used for modeling purposes but provide magnitudes of emissions from the various source categories. The data indicate that biogenic sources are significant contributors of CO and VOC as compared to the other source categories.

Based on the 2007 emission inventory analysis, NO_x emissions in the Carlsbad area are largely anthropogenic (88%). Industrial point sources account for 83%, on-road mobile sources account for 7%, oil and gas area sources account for 5%, non-road mobile sources on-road mobile sources account for 2%, and residential heating with natural gas and propane account for 1%. This inventory did not divide the point source emissions into their various industrial categories; had it done so, the overall oil and gas contribution to NOx would be much higher than presented (Applied Enviro Solutions 2011).

Table 3-11. 2007 Air Pollutant Emissions for Chaves, Eddy, and Lea Counties

	Annual Emissions (tons/year)					
Source Category	**PM_{10}**	**$PM_{2.5}$**	**CO**	**SO_2**	**NO_x**	**VOC**
Point sources	2,175	1,856	14,481	15,478	37,766	6,280
Area sources	76,514	8,686	8,892	46,394	3,063	6,166
On-road mobile	91	59	28,777	35	3,086	2,483
Non-road mobile	76	72	8,749	49	835	970
Biogenic	–	–	32,122	–	5,921	160,938
Total	***78,855***	***10,673***	***93,020***	***61,956***	***50,670***	***176,836***

NO_x = nitrogen oxides
VOC = volatile organic compound
"–" Emissions for these pollutants were not reported.
Note: Totals may not match the sum of the individual entries because some of the entries were rounded. Individual entries and totals were taken from the source document. The largest sources of PM_{10}, $PM_{2.5}$, and SO_2 in the inventory are area sources. The largest sources of CO and VOCs are biogenic sources. No greenhouse gas emissions were included in this 2011 inventory.

In 2013, another emission inventory was developed for only oil and gas production activities in Chaves, Eddy, and Lea Counties for 2008 (URS 2013). A summary of these data is presented in Table 3-12. More detailed data are included in Appendix E.

Table 3-12. 2008 Annual Emissions from Oil and Gas Activities

	Annual Emissions, tons/year							
County	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_2**	**CO**	**VOC**	**HAPs**	**CO_2e**
Chaves	367	61	1,326	9	622	10,800	1,050	2,812,771
Eddy	1,824	363	10,375	79	4,283	71,466	5,929	18,847,163
Lea	3,617	561	11,671	68	5,126	113,560	9,632	16,738,084
Total	***5,808***	***985***	***23,372***	***156***	***10,031***	***195,826***	***16,611***	***38,398,018***

NO_x = nitrogen oxides
VOC = volatile organic compound
CO_2e = carbon dioxide equivalent

With the exception of SO_2 and carbon dioxide equivalent (CO_2e), Lea County has the highest emissions from oil and gas production activities. The data suggest that oil and gas production activities are significant contributors to emissions within the CFO boundary.

Ambient Air Background Concentration Data

Representative background pollutant concentration data collected at regional monitoring sites were taken from the New Mexico Modeling Guidelines (NMED 2011). Table S.20 in Appendix S provides the background criteria pollutant concentrations and describes the location and data source of each concentration value. Pollutant concentrations in micrograms per cubic meter ($\mu g/m^3$) are shown for all pollutants, while gaseous pollutant concentrations are also shown in parts per million (ppm). These background concentrations represent existing near-field emission source impacts.

Table 3-13 provides HAP concentration data obtained from the EPA that are used to represent existing HAP concentrations (URS 2013).

Table 3-13. Hazardous Air Pollutant Background Concentrations

Averaging Time	Year	Concentration, ppbv (μg/m^3) [a]				
		Benzene	Ethylbenzene	Formaldehyde	Toluene	n-Hexane
Annual mean	2011	1.91 (6.18)	0.74 (3.27)	2.66 (3.31)	3.44 (13.17)	7.17 (25.69)
1-hour maximum	2011	33.90 (110.05)	33.81 (149.18)	4.88 (15.23)	83.79 (320.86)	152.03 (544.52)

ppbv = parts per billion by volume

[a] Background concentrations are values for year 2011 for all pollutants, except formaldehyde; formaldehyde value is for year 2010. These values were provided by the EPA for the region and all pollutant data were monitored/ collected at the Odessa, Texas (48-135-3), location for all pollutants, except formaldehyde; formaldehyde value is from the El Paso, Texas, monitor (48-141-44). Maximum 1-hour concentrations for all pollutants, except formaldehyde; formaldehyde value is maximum 24-hour concentration that is divided by 0.4 to adjust to a 1-hour average concentration. All annual values are annual arithmetic means.

Visibility

Visibility is the degree to which the atmosphere is transparent to visible light. It is an important air quality value, particularly in scenic and recreational areas. Scenic vistas in most United States parklands can be diminished by haze, which reduces contrast, dilutes colors, and reduces the distinctness or visibility of distant landscape features. Visibility degradation in national park lands and forests is a consequence of broader, regional-scale visibility impairment from visibility-reducing particles and their precursors often carried long distances to these remote locations.

Sulfates, organic matter, elemental carbon (soot), nitrogen compounds, soil dust, and their interaction with water cause most anthropogenic visibility impairment. The causes and severity of visibility impairment vary over time and from one place to another, depending on weather conditions, sunlight, and the size and proximity of emission sources.

Visibility protection requirements are included in EPA PSD regulations, which require protection of AQRVs for Class I areas. These AQRV impacts are subjective and intended to be used as guidelines for assessing potential project impacts and not as definitive regulatory thresholds. Visibility conditions are commonly quantified in deciviews (dv), a measure of visibility based on light extinction because of haze. The lower the dv level, the better the visibility.

The EPA has stated (40 CFR 51) that a delta dv level of 0.5 or more is considered to contribute to visibility impairment (corresponding to an approximately 5% increase in the light extinction coefficient), and a delta dv level of 1.0 or more is considered to cause visibility impairment (corresponding to an approximately 10% increase in the light extinction coefficient).

A “pristine” atmosphere corresponds to a dv of 0, a light extinction coefficient of 0.01, and a visual range of 391 kilometers (km). The light extinction coefficient has a linear, inversely proportional relationship with the expected visual range. For each doubling of the extinction coefficient, the visual range is approximately halved (in km). For example, an extinction coefficient of 0.02 corresponds to a visual range of approximately 196 km and a dv of approximately 7. An extinction coefficient of 0.04 corresponds to a visual range of approximately 98 km and a dv of approximately 14. The 2005–2008 annual average dv values for the three Class 1 areas near the CFO boundary are Guadalupe NP – 10.31, Salt Creek Wilderness – 12.04, and White Mountain Wilderness – 7.73 (Cooperative Institute for Research in the Atmosphere 2011).

Regulatory factors and contextual considerations (e.g., current pollutant concentrations and AQRV impacts, air quality trends in the area, expected life of the source, stringency of the emission limits, emission changes in the area, and public comments) must also be evaluated.

On September 5, 2013, the New Mexico Environmental Improvement Board unanimously adopted revisions to New Mexico’s state implementation plan for regional haze with respect to the Best Available Retrofit Determination for nitrogen oxides (NO_x) at the San Juan Generating Station. In addition, the Environmental Improvement Board adopted revisions to the interstate transport state implementation plan for the 8-hour ozone and $PM_{2.5}$ NAAQS promulgated in July 1997. A hearing was held on September 5, 2013, in Farmington, New Mexico. There are no specific requirements for regional haze that apply to the CFO boundary.

Acid Deposition

Air pollution is produced when acid chemicals are incorporated into rain, snow, fog, mist, dust, or smoke. Some of this air pollution falls to the ground as acid deposition. Atmospheric deposition of air pollutants can increase the acidity of soils and water resources. The acid comes from sulfur oxides (SO_x), NO_x, products of burning coal and other fuels, and from certain industrial processes. Wet deposition refers to acidic rain, fog, snow, or mist. Dry deposition occurs when acid chemicals are incorporated into dust or smoke (usually in areas where the weather is dry). Nitrogen and sulfur deposition is evaluated against "critical loads," which is defined as "the quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge" (FLAG 2010).

Title IV of the CAA set a goal of reducing annual SO_2 emissions by 10 million tons below 1980 levels. To achieve these reductions, the law requires a two-phase tightening of the restrictions placed on fossil fuel-fired power plants. Measurements of atmospheric deposition are currently being taken in Guadalupe National Park, located just outside the CFO boundary. The Air Quality in National Parks 2008 Annual Performance and Progress Report (NPS 2009) trends analysis for Guadalupe National Park shows that nitrogen and sulfur deposition are declining between 1998 and 2007 (NPS 2009).

Flora and Fauna

Pollutant emissions from larger point sources may impact flora and fauna at the Class I areas; however, the sensitivity of ecosystem response to increased pollutant emissions from these particular sources is not well documented and was not evaluated.

3.2.12.1.3 Trends

Reasonably Foreseeable Development

An Air Resources Technical Support Document (ARTSD) was prepared for activities associated with Amigos Bravos wells in the CFO planning area. This report provides the details and methodologies for how the emissions inventory was developed into a Microsoft Excel–based calculator using several emissions calculation data sources, including Central Regional Air Planning Association (CenRAP) and Texas Commission on Environmental Quality (TCEQ) oil and gas emissions inventory documents developed specifically for Permian Basin oil and gas activities.

Criteria Pollutants

O_3 is the criteria contaminant of most concern in the planning area. Eddy County exceeded the 8-hour O_3 standard once in 2002 and once in 2006, with levels of 0.076 ppm[2] (NMED 2009) and 0.072 in 2014 (NMED 2016); however, the county did not violate the 3-year moving average. The county is classified as Attainment with a design value of 0.069 ppm for 2013-2015 (NMED 2016). The design value is determined by the 3-year average of the annual fourth-highest 8-hour ozone average.

Appendix E provides a discussion on the URS-contracted air quality modeling completed in 2013. This modeling was prepared prior to the ozone standard change by the EPA in 2015. The ozone standard dropped from 75 parts per billion (ppb) (0.070 ppm) to 70 ppb (0.070 ppm). There are no significant trends in $PM_{2.5}$ levels or in the levels of any other monitored criteria pollutants (NMED 2009).

Although the Air Quality Index (AQI) in the region has reached the level considered unhealthy for sensitive groups several times in the last decade, there are no patterns or trends to the days AQI exceeded 100 (Table 3-14) (EPA 2015, 2018).

[2] The current NAAQS for O_3 is 0.070 ppm.

Table 3-14. Number of Days Unhealthy for Sensitive Groups (AQI 101–150)

County	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Lea	3	3	–	–	3	–	3	1	1	1	1	–
Eddy	–	5	–	–	–	–	2	3	1	–	–	–
Chaves	–	–	–	–	–	–	–	–	1	–	–	–

Over the past decade, Chaves County shows a small upward trend in maximum AQI. Lea and Eddy Counties show no significant trend in maximum AQI and none of the counties show a significant trend in median AQI (Figure S.1–S.3, Appendix S).

3.2.12.1.4 Key Features

There are several Class I and sensitive Class II parks near the CFO planning area. Class I areas include Guadalupe Mountains National Park (located adjacent to the southwestern CFO boundary), Salt Creek Wilderness (located approximately 42 miles north of the northern border of Eddy County), and White Mountain Wilderness (located approximately 13 miles north-northwest of the northwester CFO boundary). Class II areas include Muleshoe National Wildlife Refuge (located approximately 29 miles northeast of the northeastern CFO boundary) and Grulla National Wildlife Refuge (located approximately 34 miles north of the northern border of Lea County).

3.2.12.2 Climate and Weather

3.2.12.2.1 Current Condition

The climate within the CFO boundary conforms to the basic trend of the four seasons, but there are certain deviations related to topography. The topography acts to modify air masses, especially the cold outbreaks in the wintertime. In Carlsbad, the most important rains of the year occur during the summer. Frequent showers and thunderstorms from June through September account for over half of the annual precipitation.

Synoptic (large-scale) flow dominates the airflow within the CFO boundary. Daily and annual air temperatures vary considerably throughout the area and can vary greatly depending on elevation, as evidenced by monitoring data. Temperature recorded at Carlsbad has annual mean daily highs and lows ranging from 78.7°F to 49.3°F, respectively. June is the hottest month, with mean daily highs and lows ranging from 96.9°F to 65.5°F, respectively (Western Regional Climate Center 2013). Average annual precipitation in Carlsbad is 11.4 inches (Western Regional Climate Center 2013).

Meteorological surface data were collected from a National Weather Service automated surface observing system at the Carlsbad–Cavern City Air Terminal (Weather Bureau Army Navy: 93033) located at 32.33N, 104.26W for 5 years (2006–2010) (URS 2013). The wind rose shown in Figure S3.4 in Appendix S illustrates the 2006 through 2010 compilation of wind direction and speed frequencies at the Carlsbad–Cavern City Air Terminal location. The average wind speed over the 5-year period was approximately 8.81 miles per hour. For the 5-year period, winds most frequently blew from the southeast quadrant (approximately 25% of the time from southeast direction); less frequent stronger/ heavier winds blew from the west to west-southwest directions.

Greenhouse Gases

Climate change analyses comprise several factors, including greenhouse gases (GHGs)—which include water vapor, methane (CH_4), carbon dioxide (CO_2), O_3, nitrous oxide (N_2O), and chlorinated, brominated, and fluorinated gases)—land use management practices, the albedo effect (reflectivity of the surface, by vegetation or water), and the sequestration of CO_2 by oceans and living biomass (BLM 2016b). The climate change research community has not yet developed specific tools for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source (i.e., existing climate prediction models are not at a scale sufficient to estimate potential impacts of climate change within the analysis area). Also, scientific literature that addresses the climate effects of individual, facility-level GHG emissions has not been identified. Research on how GHG emissions influence global climate change and associated effects

has focused on the overall impact of emissions from aggregate regional or global sources. Global and regional-scale models lack the capability to represent important small-scale processes. GHG emissions from single sources are small relative to aggregate emissions, and GHGs, once emitted from a given source, become well mixed in the global atmosphere and have a long atmospheric lifetime (EPA 2008).

As a result, confidence in regional- and sub-regional-scale projections is lower than at the global scale. There is thus limited scientific capability in assessing, detecting, or measuring the relationship between emissions of GHGs from a specific single source and any localized impacts. As a consequence, impact assessment of effects of specific anthropogenic activities cannot be performed. While there are difficulties in attributing specific climate change impacts to any given project or activity and quantifying those impacts, projected GHG emissions can serve as a proxy for a proposed action's climate change impacts. Climate change analysis for the purpose of this document is limited to accounting for and disclosing the factors that contribute to climate change. Qualitative and/or quantitative evaluations of potential contributing factors within the planning area are included where appropriate and practicable.

According to information in Inventory of New Mexico Greenhouse Gas Emissions: 2000–2007 (NMED 2010), total CO_2e emissions in 2007 were estimated to be 76.2 million metric tons. As a point of comparison, CO_2e emissions for the United States in 2007 totaled 7,263.2 million metric tons (EPA 2013c). New Mexico GHG emissions represent about 10.5% of the total United States emissions.

3.2.12.2.2 Trends

According to the EPA, over the last century, the average annual temperature in the Southwest (defined as Utah, California, Nevada, parts of Colorado, Arizona, parts of New Mexico, and parts of Texas) has increased approximately 1.5°F (EPA 2013e). Average annual temperature is projected to rise an additional 2.5°F to 8.0°F by the end of the century. Warming has already contributed to decreases in spring snowpack and Colorado River flows. Warming in the Southwest is projected to be greatest in the summer, and future warming is projected to produce more severe droughts in the region, with reductions in water supplies (EPA 2013e). In general, the EPA indicates the following for the Southwest:

- Increasing temperatures and more frequent, severe droughts would likely worsen existing competition for water resources.
- Drought, wildfire, changes in species' geographic ranges, invasive species, and pests would likely threaten native Southwest forests and ecosystems.
- It may become difficult for the Southwest's growing cities to attain air quality standards and meet energy and water demands.
- Climate change poses threats to the region's native peoples, infrastructure, agriculture, and recreational activities (EPA 2013e).

3.2.12.2.3 Global Climate Change

Scientific investigation continues concerning the rise in global mean temperatures, the causes of this rise, and whether a warming trend would continue. GHGs have been identified as a contributor to the rise in global mean temperatures. Ongoing scientific research has identified the potential impacts of anthropogenic (from human activities) GHG emissions and changes in biologic carbon sequestration on the global climate. Through complex interactions on a regional and global scale, these changes are likely causing a net warming effect of the atmosphere, primarily by decreasing the amount of heat radiated by the earth back into space, much as glass traps heat over a greenhouse.

GHGs absorb infrared radiation and trap its heat in the atmosphere. Many gases exhibit GHG properties; some occur naturally, such as water vapor, CO_2, CH_4, O_3, and N_2O. Others are synthetic, such as chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Some of the naturally occurring GHGs are also produced by anthropogenic activities. The study of global climate change is complex because there are many factors that may contribute to changes in the earth's temperature, including the emission of GHGs, as well as the earth's ability to remove these gases from the atmosphere through mechanisms such as photosynthesis and ocean uptake. Analysis of climatic change comprises several factors, including GHG emissions, land use management practices, and the albedo effect (i.e., the cycle of increased temperature resulting from the increased absorption of normally reflected light).

The Intergovernmental Panel on Climate Change (IPCC) reports that it is extremely likely (95%–100% probability) that human influence has been the dominant cause of the observed warming since the mid-twentieth century (BLM 2016b). Based on projections from IPCC, global mean surface temperatures have already increased 1.5°F from 1880 to 2012. Additional near-term warming is inevitable due to the thermal inertia of the oceans and ongoing GHG emissions. Assuming there are no major volcanic eruptions or long-term changes in solar irradiance, the global mean surface temperature increase for the period 2016 to 2035 relative to 1986–2005 will likely be in the range of 0.5°F to 1.3°F. Global mean temperatures are expected to continue rising over the twenty-first century under all of the projected future representative concentration pathways concentration scenarios (BLM 2016b).

Climate change will impact regions differently and warming will not be equally distributed. Greater impacts are expected at higher latitudes, in the tropics and subtropics, than are expected in the mid-latitudes. Warming of surface air temperature over land will likely be greater than over oceans. Frequency of warm days and nights will increase and frequency of cold days and cold nights will decrease in most regions. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. Increases in the duration, intensity, and extent of extreme weather events are predicted. The frequency of both high and low temperature events is expected to increase. Near- and long-term changes are also projected in precipitation, atmospheric circulation, air quality, ocean temperatures and salinity, and sea ice cover. Climate change is expected to persist for many centuries even if emissions of CO_2 are stopped but continued increases in concentrations may accelerate the rate of climate change in the future (BLM 2016b).

The predominant GHGs emitted in the United States are CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Anthropogenic GHG emissions come primarily from burning fossil fuels, which accounted for 94% of CO_2 emissions in 2011. Globally, the United States accounted for approximately 18% of the CO_2 added to the atmosphere through the combustion of fossil fuels in 2010 (EPA 2013c).

CH_4 emissions from landfills, coal mines, oil and natural gas operations, and agriculture accounted for 9% of United States GHG emissions in 2011. N_2O emitted from agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste, accounted for 5% of total 2011 GHG emissions. Several human-made fluorinated gases accounted for 2% of the total 2011 GHG emissions (EPA 2013d).

GHG inventories are usually reported in terms of "CO_2 equivalents" to account for the relative global warming potential, or a given pollutant's ability to trap heat. For example, CH_4 has a global warming potential of 25, meaning it is 25 times more effective at trapping heat than CO_2. N_2O has a global warming potential of 298, meaning it is 298 times more effective at trapping heat than CO_2. Hydrofluorocarbons range from 12 to 14,800 global warming potential, whereas perfluorinated compounds range from 7,390 to 17,340 global warming potential (*Federal Register* 2013).

There are many regional sources that may contribute to global climate change, including those sources presented in Appendix E. Current global climate models are unable to forecast local or regional effects on resources making it difficult to determine the impact of the existing regional sources to climate change. However, there are general projections regarding potential impacts to natural resources and plant and animal species that may be attributed to climate change from GHG emissions over time; but these effects are likely to be varied, including those in the southwestern United States. For example, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils due to warmer and drier climate. Impacts to cool season plant species' spatial ranges, accelerated extinction of endemic threatened or endangered plants, impacts to animal species, and impacts to water resources are expected (BLM 2016b).

The CFO works with other federal and state agencies, as well as local stakeholders, to provide context, specific data, user-friendly tools, and information to help staff make climate-sensitive decisions.

3.3 RESOURCE USES

3.3.1 Minerals

The BLM administers the mineral resources on the nation's public lands. Their development is dependent on decisions in the land use planning process. The BLM also helps administer mineral resources on the nation's forests and in specially designated lands like parks and monuments. Various laws, including FLPMA (43 USC 1701, et seq.), mandate that the BLM administer the exploration for and development of these mineral resources on public lands for the benefit of the citizens of the United States. Through the BLM's regulations, citizens or corporations of the United States may acquire the rights to explore or develop mineral resource deposits on the public lands.

Extensive deposits of mineral resources occur in the CFO planning area. These resources include elemental concentrations of minerals, mineral-like substances, and hydrocarbons that occur in concentrated deposits at or near the surface or in the subsurface of the Earth.

3.3.1.1 Surface and Mineral Estates

Public lands include those lands for which BLM administers an ownership interest in the land. Tracts of land may be administered for surface and/or subsurface estates. Mineral deposits are considered part of the mineral estate and can occur at the surface or in the subsurface. Deposits of different minerals may occur in the same location in different stratigraphic layers. When this occurs, the mineral ownership may be split such that one individual or company owns or has rights to the oil and gas resources and another owns other mineral resources. The BLM is responsible for the management of each mineral resource when there is multiple ownership of the mineral estate. Split estate lands are those where the federal government owns either the mineral estate or surface estate and another entity owns the other. Ownership of the mineral estate may be split further with the federal government owning one mineral and another owned by someone else. In this dual ownership system, the surface may be owned by a private individual or a state or local government, and the mineral estate owned by the citizens of the United States, or the surface may be federally administered (federal surface) and the mineral estate owned by another entity. Any public lands with a split ownership are called split estate lands.

Surface estate distribution in the CFO planning area is shown in Map 3-1 in Appendix B, and mineral estate status is shown in Maps 3-15 and 3.16 in Appendix B. A summary of the acreage of the surface and mineral estates administered by the BLM in each applicable county is shown in Table 3-15 and Table 3-16.

Table 3-15. Surface Estate Administration Acreage in the Planning Area

Surface Administration	Chaves County	Eddy County	Lea County
BLM	294,794	1,374,261	422,828
Bureau of Reclamation	–	14,148	–
DOE	–	10,249	–
USFS	40,262	133,964	–
NPS	–	46,518	–
Private	306,657	596,918	1,447,751
State	119,239	472,914	938,978
NMDGF	–	30,757	2,764
State Parks	–	4,704	–
Total	***760,952***	***2,684,433***	***2,812,321***

Source CFO GIS Data Files 2014.

Table 3-16. Mineral Estate Administration Acreage in the Planning Area

Mineral Estate Administration	Chaves County	Eddy County	Lea County
BLM**	294,825	1,376,197	422,866
Bureau of Reclamation	–	13,988	–
DOE	–	10,249	–
USFS	40,311	133,964	–
NPS	–	46,518	–
Private	306,796	596,132	1,438,625
State	119,246	473,230	948,192
NMDGF	–	30,757	2,764
State parks	–	5,882	–
Total	***761,178***	***2,686,916***	***2,812,446****

Source: CFO GIS Data Files 2014.
*Note: The difference in acreages is due to slight irregularities in the GIS shapefiles.
**If the BLM administers any part of the mineral estate under any other agency surface estate, the acreage is shown under the BLM.

3.3.1.2 Mineral Resource Availability

The mineral laws of the United States, like the Mining and Minerals Policy Act of 1970 (30 USC 21, et seq.), encourage the efficient, orderly, and environmentally sound development of the nation's mineral resources. These laws provide guidance to the BLM and other surface management agencies (e.g., USFS) for the exploration and development of the mineral resources. BLM attempts to identify lands that contain mineral resources and makes decisions through the land use planning process whether to keep these lands available for mineral resource development. Lands with mineral resources typically are left open for mineral resource development; however, lands are sometimes closed to mineral resource development to protect other resources from damage or to allow a specific kind of development that is not compatible with development of the mineral resources.

The BLM uses a mineral resource assessment system to help determine whether lands should be left open for mineral exploration and development. There are two parts to the mineral resource assessment system, potential for occurrence and potential for development.

The mineral resource potential for occurrence of mineral resources in the planning area is categorized using the system outlined in BLM Manual 3031. Under this system, potential for occurrence ratings are strictly based on the geologic potential of the presence of a particular mineral and do not address the economic feasibility of development of the resource. These ratings address the accumulation of mineral resources and certainty of data. Mineral potential for occurrence refers to the potential of the mineral to occur at a specific location or in a specific geologic environment. Categories of potential are referred to as none, low, moderate, or high.

Potential for development refers to the potential for a deposit to be economically produced. The potential for development of each mineral resource is projected for the life of the RMP, which is estimated to be 20 years, and is rated as low, moderate, or high. The potential for development is based on communication with industry experts and government officials familiar with the specific resources and considerations such as mineral occurrence potential, historic development, commodity price and demand, and other factors. The potential for development may be directly affected by planning decisions that restrict or preclude mineral exploration and/or development activity. The development rating is also affected by the ownership status of the land in which the commodity is found. Resources found in national parks, national monuments, recreational areas, wilderness areas, and WSAs are generally not available for mineral development, except for valid existing rights. For that reason, these areas are considered to have a low potential for development.

3.3.1.3 Lands Withdrawn from Mineral Development and Special Designations

Most lands in the CFO planning area are currently open to mineral resource exploration and development. However, some lands are currently closed to mineral resource development of all types due to laws, regulations, or special land designations. The acreages for these areas are shown in Table 3-17.

Table 3-17. Lands in the CPA Planning Area Withdrawn from Mineral Development.

Withdrawn Area or Special Designation	Acreage	Minerals Affected
Seven Rivers Hill	540	All minerals
Cave Resources	8,450	All minerals
Chosa Draw ACEC	1,160	All minerals
Lonesome Ridge ACEC	2,990	All minerals
Springs Riparian Habitat SMAs	524	All minerals
Yeso Hills	560	All minerals
Bluntnose Shiner Habitat	200	All minerals
Little McKittrick Draw	10	All minerals
Pecos River / Canyons Complex ACEC	4,100	All minerals
Pecos River Corridor	1,729	All minerals
Total	***20,263***	***All minerals***

Source: CFO Data Files.

The Secretary of the Interior issued an order in 2012 to provide guidelines for the leasing and development of oil and gas and potash resources that occur on the same lands. Secretarial Order 3324 (77 *Federal Register* 71814, see Appendix R) establishes the rules for the orderly co-development of oil and gas and potash deposits owned by the United States within the designated Potash Area in eastern Eddy and western Lea Counties (Map 3-17 in Appendix B). The Secretarial Order reaffirms the established Designated Potash Area, encompassing approximately 497,002 acres.

Management of oil and gas outside of the Designated Potash Area is per the Ochoa Mine Project ROD (BLM 2014a).

3.3.1.4 Categories of Mineral Resources

The BLM recognizes three major categories of mineral resources—leasable, locatable, and salable. Helium is discussed under fluid leasables. All categories of mineral resources can be found in the CFO planning area.

3.3.1.4.1 Fluid and Solid Leasable Mineral Resources

Leasable mineral resources are those commodities that are administered under the Mineral Leasing Act of 1920, as amended and supplemented (30 USC 181, et seq.), the Mineral Leasing Act for Acquired Lands of 1947, as amended and supplemented (30 USC 351, et seq.), and the Geothermal Steam Act of 1970, as amended and supplemented (30 USC 1001, et seq.). Leasable mineral resources include both fluid and solid mineral substances. Administration of leasable minerals is the responsibility of the BLM under the following regulations: fluid mineral resources – oil and natural gas at 43 CFR 3100; geothermal resources under the regulations at 43 CFR 3200; solid mineral resources – coal under regulations at 43 CFR 3400; oil shale regulations are pending; and all other solid leasable mineral resources are administered under regulations at 43 CFR 3500.

For all leasable mineral resources, the BLM or proponents identify lands, with potential for resource development. For fluid mineral resources, the BLM holds a competitive sale for those identified lands if they are eligible for leasing. Citizens and corporations bid on the tracts of land to acquire a competitive lease for

the rights to explore and produce the mineral commodities. For solid mineral resources, the process can be more complicated. Inside areas with known deposits, the BLM holds competitive lease sales. Outside areas of known deposits, proponents can apply for prospecting permits to explore for the resource, then submit a preference right lease application (PRLA) if an economically viable deposit is discovered.

Mineral resources leased under the Mineral Leasing Act of 1920 require the lessee to pay an annual rental per acre for the exploration and development rights and a minimum production royalty. If a commodity is produced, the lessee makes a royalty payment to the United States on a fixed percentage of the gross revenues.

The leasing and development of oil and natural gas is accomplished in several stages. The first stage is categorization of the land for land use planning purposes in which a determination is made which lands should be leased and with which restrictions. The second stage is leasing. The third stage is exploration, development, production, and reclamation.

For fluid leasable mineral resources, the land use plan must identify lands in four land use categories, open to leasing with standard stipulations, open to leasing with minor and moderate constraints, open to leasing with highly restrictive, major constraints, and closed to leasing.

- **Open with Standard Terms and Conditions:** This category identifies lands that are open to exploration and development subject to standard lease stipulations on a standard lease form.
- **Open with Minor or Moderate Constraints:** This category identifies lands that are open to leasing with relatively minor and moderate constraints such as seasonal restrictions. These areas possess other land uses or resource values such as critical special status plant and wildlife species habitat that might conflict with fluid leasable exploration and development, and, therefore, moderately restrictive lease stipulations may be required to mitigate these impacts. The stipulations are used where resource values require some sort of special protection, but the conflicts with fluid leasable exploration and development are not of sufficient magnitude to preclude surface occupancy.
- **Open with Major Constraints:** This mineral lease category identifies areas that are open to exploration and development but subject to highly restrictive lease stipulations, which includes NSO. These areas possess special resource values or land uses such as camping or picnic areas, scenic areas, Recreation and Public Purpose patents and leases, important historical or archaeological areas, and buffer zones along the boundaries of special use areas such as wild and scenic river corridors. This category is used for those areas where a number of seasonal or other minor constraints would severely restrict exploration and development.
- **Closed to Leasing:** This lease category identifies areas that are closed to leasing either by discretionary or non-discretionary decisions. These areas have other land uses or resource values that cannot be adequately protected even with the most restrictive lease stipulations. Closing these areas to leasing is the only way to ensure their appropriate protection. Discretionary closures involve lands where BLM has determined that energy or mineral leasing, entry, or disposal, even with the most restrictive stipulations or conditions, would not be in the public interest. Non-discretionary closures involve lands that are specifically closed to energy or mineral leasing, entry, or disposal by law, regulations, Secretarial decision, or Executive Order.

Current land use plan allocations for leasable minerals for surface and subsurface lands are shown in Map 3-18 in Appendix B.

After the lands are categorized for leasing, they are open to the public for exploration. The public may conduct exploration, then file expressions of interest for leasing the land. After the BLM receives an expression of interest, it holds a competitive sale and offers lands for lease. Qualified bidders submit their bids for the rights to further explore and develop tracts of land. Successful bidders enter leases with the BLM for these rights. Leases are issued with standard provisions and special stipulations to protect other resources on the leased lands. Companies then submit applications for permit to drill (APDs) to explore further the lands. Applications for exploration and development are processed by the BLM in accordance with regulations and approved with additional COAs to protect other resources. If a lease goes into production, a royalty is paid to the U.S. Treasury based on the amount of produced product. When a well is no longer capable of producing in commercial quantities, it is plugged and abandoned, and the well site is reclaimed.

Heated, geothermal water is a special category of a fluid leasable mineral resource. Heat is extracted from water pumped to the surface, then the water is returned to the subsurface to regain its heat potential.

Solid mineral resources that can be developed under the Mineral Leasing Act of 1920 include coal, gilsonite and all solid vein-like hydrocarbons, oil shale, phosphate, sodium, potassium, sulfur in Louisiana and New Mexico, and, for acquired lands, hard rock mineral substances that typically would be locatable.

For solid leasable mineral resources, the land use plan must identify lands open and closed for leasing and any area-wide constraints on leases. For those lands identified in the land use plan as open for leasing, proponents may file for exploration licenses or prospecting permits to explore the lands. Exploration and leasing follows one of two paths. In areas designated as a Known Leasing Area (KLA) for a particular mineral, an exploration license may be obtained to further delineate a deposit. Once exploration has been completed, the area may be leased through the competitive leasing process. For a current lessee, adjacent areas may be leased noncompetitively through a fringe acreage lease or by adding the lands to an existing lease (Lease Modification). In areas outside of a KLA, a proponent must obtain a prospecting permit. If a mineral deposit is discovered through exploration on a prospecting permit, they can file for a Preference Right Lease Application (PRLA). If a determination is made that a valuable deposit has been discovered and, in the case for potassium and sodium, the lands are determined to be chiefly valuable for the mineral, they can be awarded a preference right lease.

Solid mineral resources typically are developed with conventional surface and/or underground mining techniques or by in-situ (solution) mining. Deposits are produced until economically depleted, then the land is reclaimed.

Helium

Helium is a natural gas that often occurs in reservoirs associated with other natural gases in oil and gas fields. It is administered by the BLM under the Helium Act of 1925, as amended and supplemented (50 USC 161, et seq.). Helium gas is produced along with leasable natural gases; however, it is sold to the private sector in negotiated sales contracts under a strict regulatory framework.

Since helium is produced in a natural gas stream, the land use plan categories that apply to fluid leasable minerals also apply to sales of helium. Therefore, helium is included in the four land use categories, open to leasing (and helium sales) with standard stipulations, open to leasing (and helium sales) with minor and moderate constraints, open to leasing (and helium sales) with highly restrictive, major constraints, and closed to leasing (and helium sales).

Because helium is intimately associated with other natural gases, it is discussed below in the section covering oil and natural gas.

3.3.1.4.2 Locatable Mineral Resources

Locatable mineral resources are those commodities that are administered under the Mining Law of 1872, as amended and supplemented, otherwise known as the General Mining Laws (30 USC 22, et seq.).

These mineral resources include metals (e.g., copper, uranium, gold, and silver), some kinds of industrial deposits (e.g., gypsum and some kinds of limestone), and, under specific conditions, uncommon varieties of sand, stone, gravel, pumice, pumicite, and cinders, as well as exceptional clay.

These mineral resources may be developed by citizens of the United States or businesses incorporated in the United States on public lands that are open to entry under the General Mining Laws. The public may explore these open public lands, embrace the mineral deposit through location of a mining claim, and develop the minerals if an economically viable deposit is discovered. Prior to a patent moratorium imposed by Congress on October 1, 1994, claimants could apply for patent of the mining claims and receive patent if an economically valuable mineral deposit had been discovered. However, Congress has continued the moratorium on processing patents.

No monies are paid to the United States for locatable mineral commodities.

The BLM administers the mining claims and operations on lands open to entry under regulations at 43 CFR 3700 and 3800. Unlike the regulations for leasable and salable mineral resources in which the BLM is given broad authority and discretion for approval or denial of mining operations, the regulations at 43 CFR 3800 require that the BLM manage locatable minerals only to prevent unnecessary and undue degradation. In effect, the BLM does not have the authority to deny mining operations on lands open to location and entry under the General Mining Laws. It does, however, have the authority to manage mining operations to the extent that they do not cause unnecessary or undue degradation of public land resources.

The land use planning decision is whether lands are open or closed to location and entry under the General Mining Laws. Current land use plan allocations for locatable minerals for surface and subsurface lands are shown in Map 3-19 in Appendix B.

Locatable mineral resources typically are developed with conventional surface and/or underground mining techniques. Mine sites are reclaimed after the deposit has been depleted.

3.3.1.4.3 Salable Mineral Resources

Salable mineral resources are those commodities that are administered under the Materials Act of 1947, as amended and supplemented (30 USC 601, et seq.). These mineral resources include common clay, petrified wood, and common varieties of sand, stone, gravel, caliche, pumice, pumicite, and cinders. These commodities often are referred to as mineral materials and are administered by the BLM under regulations at 43 CFR 3600. Citizens of the United States, U.S. companies, and foreign entities may acquire rights to explore for mineral materials at the discretion of the BLM. These resources may be developed by entering into either a competitive or negotiated sales contract with the BLM. In areas designated as a community pit or a common use area, a sales contract is obtained from the BLM. Proponents pay for the materials by a tonnage or volume basis at the appraised or negotiated value. Mineral materials also may be disposed to government entities and non-profit organizations under a free use permit. Similar to leasable mineral resources, mineral materials may be sold from split estate lands with private surface and federal mineral estate. Under these conditions, a land owner's agreement is usually obtained to allow access to the surface and to arrange for surface damages.

The land use plan must identify lands open or closed to mineral material permits and sales, and any major constraints on mineral material permits and contracts. Current land use allocations for salable minerals for surface and subsurface lands are shown in Map 3-20 in Appendix B. For lands open for entry, the BLM will not dispose of mineral materials if it determines that the aggregate damage to public lands and resources would exceed the public benefits that the BLM expects from the proposed disposition.

Salable mineral resources typically are developed using conventional quarrying techniques. Mine sites are reclaimed after the deposit has been depleted.

3.3.1.5 Fluid Leasable Minerals

3.3.1.5.1 Oil and Gas

Oil and natural gas (oil and gas) are fluid hydrocarbon compounds that occur in the pore spaces between sand grains and along fractures in sedimentary rocks like sandstone and limestone. Differential pressure underground causes the oil and gas to migrate between pore spaces, and it can be concentrated in structural and stratigraphic traps. Expansive traps of oil and natural gases are called reservoirs or pools. Reservoirs are sometimes tapped through drilling, and the fluid hydrocarbons either flow under pressure to the surface, or they are pumped to the surface. A play is an area or specific stratigraphic zone that is being actively explored for fluid hydrocarbons. Extensive plays and pools of oil and gas occur in the CFO planning area.

The planning area encompasses the New Mexico portion of the Permian Basin, a sedimentary depositional basin that contains sedimentary rocks with a thickness of greater than 30,000 feet known for its oil and gas production. The planning area contains the Delaware sub-basin, Northwest Shelf, and Central Basin platform parts of the greater Permian Basin.

The Permian Basin is one of the premier oil and gas producing regions in the United States, and prolific producing horizons occur in the New Mexico portion of the basin in Eddy and Lea Counties. The distribution of the current oil and natural gas fields in the New Mexico portion of the basin is shown in Map 3-21 in Appendix B. Large numbers of oil and gas fields occur in both Eddy and Lea County in the planning area. No producing fields occur in the Chaves County portion of the planning area.

The oil and gas reservoirs can be grouped into 22 plays with common characteristics (Engler et al. 2012: A-3). Oil and gas production is dominated by Leonardian and Guadalupian-age dolostones and sandstones of the Abo, Yeso, Glorieta, San Andres, Grayburg, Queen, and Yates Formations. Significant production is also obtained from basinal carbonates of the Bone Spring Formation and basinal sandstones of the Delaware Mountain Group. The pre-Permian section also has yielded significant volumes of oil and gas. Pre-Permian oil production is dominated by restricted shelf dolostones of the Ellenburger, Simpson, and Montoya Formations (Ordovician), restricted shelf dolostones of the Thirtyone and Fusselman Formations (Silurian-Devonian), and open shelf-shelf margin limestones and dolostones of the Canyon and Cisco sections (Pennsylvania: Missourian-Virgilian). Pre-Permian gas production is dominated by fluvial, deltaic, strandplain, and submarine fan sandstones of the Morrowan section (Pennsylvanian) and open shelf to shelf margin limestones and dolostones of the Canyon and Cisco sections (Broadhead and Speer 1993: 293).

Past and Present Exploration, Development, and Production

The Permian Basin in southeastern New Mexico began producing oil and gas in 1924 and has produced continuously since (Engler et al. 2012:1).

New Mexico ranks sixth in the United States in the production of oil. In 2012, it produced 85.2 million barrels of oil, 80.5 million barrels of which were produced in the CFO planning area (BLM 2014a). New Mexico ranks seventh in the United States in the production of natural gas. In 2012, it produced 1.25 trillion cubic feet of natural gas, of which 411.3 billion cubic feet (Bcf) were produced in the planning area (BLM 2014a). Consequently, the planning area is considered one of the most prolific oil and gas producing regions under the BLM's administration. The planning area continues to be the focus of extensive exploration, leasing, development, and production.

Eddy and Lea Counties are responsible for the majority of past production in southeastern New Mexico. Gas production in Eddy and Lea Counties had a period of decline until 1986, then production increased until 2000. It has slightly declined since then. Production of oil generally has been declining slightly since 1970 as the fields approach maturity. However, millions of barrels of oil and billions of cubic feet of gas still remain in the existing fields, and new plays are explored each day.

Helium has been reported in natural gas streams in both Eddy and Lea Counties, but no production has been reported.

Currently, a high level of exploration and development activity continues in the oil and gas fields in southeastern New Mexico.

Exploration includes both direct and indirect exploration methods. Direct methods include mapping surface geology, observing seeps, and gathering information from drill cuttings and core extraction during the drilling process. Indirect methods, such as gravity, magnetic, and seismic surveys, are used to delineate subsurface features that may contain oil and gas that are not directly observable. The petroleum industry uses 2D, 3D, and 4D seismic technology to gain subsurface stratigraphic information to aid them in searching for oil and gas reserves. Seismic technology uses explosives in drilled shot holes as source points along linear survey lines or vibroseis, shakers, trucks, or buggies as source points in a grid pattern over a large area that can cover hundreds of square miles.

Companies file notices of intent to conduct geophysical operations to gain access to federal lands for this geophysical exploration. Since 2004, 575,000 acres have been surveyed in the planning area using this seismic technology. Most of the geophysical surveys have been conducted in the areas of active drilling in Lea and Eddy Counties. The CFO processes approximately five notices of intent per year for geophysical operations, although this number would likely increase in the coming years due to increased exploration activity for oil and natural gas. Current activity is concentrated in the southern parts of Lea and Eddy Counties along the New Mexico–Texas border.

Current exploration also is reflected in the number of leases that are issued and the number of APDs that are processed in the CFO planning area.

The BLM reviews and approves nominations from companies to lease federal minerals that further exploration, development, and production of oil and gas. As of November 13, 2013, federal oil and gas leases covered approximately 1,955,720 acres in the planning area. By county, the number of leases and total number of acres under lease are shown in Table 3-18.

Table 3-18. Number of Oil and Gas Leases by County in the Planning Area

County	Number of Leases	Acres under Lease
Chaves	36	25,385
Eddy	2,794	1,269,535
Lea	1,637	660,800
Total	***4,467***	***1,955,720***

Source: BLM 2014a.

The majority of the federal mineral estate managed by the CFO is currently leased. All of the planning area is open to leasing except for certain areas that have been withdrawn from leasing by Congressional, Secretarial, or Executive Order, or closed through the land use planning process. Table 3-19 shows the current leased acreage assigned to each land use category for oil and gas mineral resources in the planning area.

Table 3-19. Fluid Mineral Land Use Category Acreage in the Planning Area

Land Use Category	Acreage
Open to Leasing with Standard Terms and Conditions	**1,598,870**
Open to Leasing with Minor to Moderate Constraints	
City of Carlsbad Water Well Field	29,520
East Guadalupe Escarpment Habitat Management Area	25,600
Other	*901,290*
Total	***956,410***
Open to Leasing with Major Constraints	
Black River Buckwheat Population Area	720
Bluntnose Shiner Habitat Management Area	200
CP Hill Buckwheat Population Area	360
Devil's Den	320
Guadalupe Escarpment Scenic Area (Zone 1)	11,700
Laguna Plata Archeological District	3,360
Maroon Cliffs Archeological District	5,820
McKittrick Canyon	200
Pecos River Canyon Complex ACEC/RNA	4,505
Poco Site	265
Pope's Well	80
Seven Rivers Hill Habitat Management Area	540
South Texas Hill RNA	3,600
Yeso Hills RNA	557
Other	22,375
Total	***54,602***
Closed to Leasing	
Cave Protection Zones (Dark Canyon)	10,120
Chosa Draw ACEC	2,820
Devil's Den WSA	320
Little Walt Canyon Quarry Site	40
Lonesome Ridge WSA	3,505

Land Use Category	Acreage
McKittrick Canyon WSA	200
McKittrick Hill Cave	5,240
Maroon Cliffs Archeological District	12,019
Mudgetts WSA	1,060
Other	139,061
Total	***174,391***
Grand Total	***2,784,273***

Source: CFO data files.

The total number of wells drilled on the leases in the planning area varies from day to day; however, as of 2013, approximately 15,000 active wells were being administered by the CFO. Additionally, the CFO processes approximately 850 APDs per year for the planning area. An example of the well statistics for Eddy and Lea Counties from 2013 is shown in Table 3-20. No active wells exist in Chaves County.

Table 3-20. Oil and Natural Gas Well Statistics for Eddy and Lea Counties, 2013

Well Status	Federal	Fee and State	Total
Eddy County			
Total inactive wells	165	190	355
Total injection/disposal wells	788	346	1134
Total active wells	8,542	6,072	14,614
Lea County			
Total inactive wells	141	375	516
Total injection/disposal wells	616	1,884	2,500
Total active wells	4,850	11,473	16,323

After a well is drilled, cement is placed between the casing and the wellbore to provide a hydraulic seal and adequate isolation between the strata; it is then completed by setting and perforating the casing. Once hydraulically fractured, by injecting a mixture of sand, water, and other constituents at high pressure into the rock formation to create fractures, it then is ready to produce oil and gas. Well completions have historically been steady in the planning area, typically following the trend of oil and gas prices. However, since 2006, the percentage of wells drilled horizontally has increased substantially. Recompletions, or completing a well in a different producing horizon, are higher than may be expected in a typical oil field because of a large number of producing formations and the maturity of the oil fields. This does affect the number of wells plugged or put into temporary abandonment status. In many cases, a well would be drilled and completed, and subsequently plugged when the economic limit is reached. In southeastern New Mexico, a well would frequently be temporarily abandoned and evaluated for up hole potential, meaning the zone above the producing horizon could have the potential to produce hydrocarbons. Additionally, down hole commingling, or combining production in the wellbore from different geologic formations, has extended the life of wells that are not economically viable when producing from a single formation. Surface commingling and multiple wells from single pads have increased, resulting in a reduction of surface disturbance (BLM 2015a).

The distribution of recent well completions is shown in Map 3-21 in Appendix B. The highest concentrations of the most recent well completions are in northeastern and southeastern Eddy County and western and south-central Lea County, although some completions are scattered throughout the planning area. A high number of recompletions occur in known, existing reservoirs.

Recent production of oil in the planning area has increased slightly. Production of natural gas continues to decline. Table 3-21 shows the production from 2006 to 2010. Overall, the industry has remained relatively stable for the last several years (BLM 2013).

Table 3-21. Oil and Gas Activity in the Planning Area, 2006–2010

Site	Units	2006	2007	2008	2009	2010
Oil and Gas Extraction						
Natural gas	Bcf	268.3	247.9	228.3	216.1	213.2
Crude oil	Million barrels	30.4	30.5	30.6	33.1	36.1
Oil and gas wells–drilled	Number	477	389	450	391	494

Source: BLM 2015a.

Lea County typically produces more oil but less gas than Eddy County. Production by county is shown in Table 3-22.

Table 3-22. Oil and Gas Production from Eddy and Lea Counties, 2009

County	Oil (barrels)	Natural Gas (Bcf)
Eddy	24,500,000	223.6
Lea	33,000,000	202.8

Source: BLM 2015a.

Water is usually a byproduct of oil and gas production and is disposed of via injection into geologic formations. Two types of wells are used for this disposal. An injection well is used to pump water into the reservoir and drive oil and gas to an offset producing well. A disposal well is needed when there is no other use for the produced water. The number of disposal and injection wells continues to increase in the planning area. In 2009, Eddy and Lea Counties produced about 58 million barrels of oil and 616 million barrels of produced water. As of the end of 2013, 1,404 total wells inject produced water or are used for saltwater disposal in Eddy and Lea Counties (BLM 2015a).

Development Potential

The United States consumed, on average, 18.5 million barrels of liquid fuels, 60% of which was from domestic crude oil production, and 70.2 Bcf of gas each day in 2012. Based on the *Annual Energy Outlook 2014* (EIA 2014:MT-5), total energy consumption in the United States is projected to increase over the next 20 years. Total consumption of liquid fuels, including both fossil liquids and biofuels, is projected to grow from 18.5 million barrels per day in 2012 to 19.3 million barrels per day in 2025, then decline to 18.8 million barrels by 2035 (EIA 2014:CP-14). Natural gas consumption is projected to increase from 25.6 trillion cubic feet in 2012 to 28.4 trillion cubic feet in 2025 and 30.4 trillion cubic feet in 2035 (EIA 2014:CP-10).

An increase in the demand for oil and gas resources also is expected in the planning area based on the projected increases in demand for oil and gas and the rising national demand for energy. Although existing legislation encourages the use of renewable energy, the demand for fossil fuels is likely to continue for the next 20 years.

The most likely location for further development of oil and gas in the planning area would be in areas of the recently developed plays. These plays occur throughout the planning area but are concentrated in northeastern and southeastern Eddy County and western and southeast-central Lea County.

Engler et al. (2012:14) report that the highest potential for oil and gas exploration and production is for the Bone Spring and Leonard-Yeso stratigraphic zones. Horizontal drilling is planned in the Bone Spring, and down hole stimulation is planned for the Leonard-Yeso. Additionally, water flooding or enhanced oil recovery (EOR) with CO_2 is planned for the Abo Platform carbonates, the Delaware Mountain Group, and the Artesia-Vacuum trend.

The widespread Artesia Sandstone Group, Wolfcamp, and San Andres Formation on the Central Basin Platform all have moderate potential for further exploration and production for oil and gas (Engler et al. 2012:14). Other zones shown in Table S.21 in Appendix S have lower potential for further exploration for oil because the deposits are of limited extent or contain mostly natural gas. However, all stratigraphic zones, even those with low potential for further exploration, would continue to produce oil and gas until they are depleted several years into the future.

Most likely, exploration using geophysical techniques and drilling would continue at present levels during the life of the RMP. The BLM expects approximately 600 to 800 APDs per year to be submitted in future years, depending on economic circumstances (BLM 2014a).

The current trends in oil and gas production would likely continue in the planning area.

Improved drilling and completion techniques (e.g., horizontal drilling, and hydraulic fracturing[3]) would give opportunity for further development in areas that were previously overlooked. Well completions would remain stable with a potential to increase if gas prices climb. Although not all drilling permits are drilled and completed as wells, the correlation between drilling permits and completed wells is expected to remain the same (BLM 2014a).

As drilling technology advances and the need to reduce surface disturbance in sensitive areas grows, horizontal wells will be used more frequently to produce oil and gas. An increase in horizontal wells has occurred in the last 10 years. This trend is likely to continue (Engler et al. 2012:30), which could reduce the overall number of wells drilled and completed (BLM 2014a). About 60% of completions are for new wells, and about 40% is for recompletions and dual completions. As a result, recompletions, commingled zones, and dual completions are a significant benefit because they allow the development of resources without increasing the amount of surface disturbance (Engler et al. 2012:22). Additionally, advances in technology could allow additional areas to be leased with an NSO stipulation.

The development of the Bone Spring Avalon Shale Play may result in additional horizontal well completions (BLM 2014a). Additionally, several fields would most likely be further developed with EOR techniques as the fields mature and reservoirs approach depletion (Engler et al. 2012:17). Injection wells would be added to mature fields to aid in recovery of oil that would otherwise remain in the reservoir.

The Secretarial Order 3324 (77 *Federal Register* 71814) that allows for concurrent development of oil, gas, and potash resources within the Secretary's potash area would continue to have an effect on oil and gas drilling and leasing. Wells must be drilled at a safe distance from existing mine workings to prevent damage to the mines and the wellbore from subsidence due to mining. Oil and gas wells also are limited to locations that would pose minimal impacts to potash reserves (BLM 2014a).

The number of water disposal wells is increasing as a result of the increase in horizontal drilling. The benefit to drilling a horizontal well is that it reduces surface disturbance and increases the production. However, the production from one horizontal well is equivalent to that from multiple vertical wells. Therefore, this results in a need for additional saltwater disposal wells (BLM 2014a).

Because of the rise in the price of oil, oil plays would continue to be explored through increased drilling. Natural gas play drilling most likely would decrease because of the continuing depressed well head price of natural gas (Engler et al. 2012:39).

Consequently, the potential for development of oil and natural gas resources is high in both Eddy and Lea Counties (Map 3-22 in Appendix B). The potential for occurrence and development is low for Chaves County.

Helium has never been economically produced from the planning area because the helium concentrations in natural gas streams are too low to allow economic separation. Most likely, helium will not be explored or developed in the planning area during the planning period. Therefore, helium has no potential for development in Chaves, Eddy, or Lea Counties. Helium will not be discussed further.

[3] "Hydraulic fracturing is a technique used to increase oil and gas production from underground oil- and/or gas-bearing rock formations (reservoirs). The technique involves the injection of hydraulic fracturing fluids through the production well and into the reservoir under pressure great enough to fracture the reservoir rock. Hydraulic fracturing fluids typically consist of water, a "proppant" (typically sand) that props open the created fractures, and additives (usually chemicals) that modify the properties of the fluid for fracturing. Fractures created during hydraulic fracturing enable better flow of oil and gas from the reservoir into the production well. Water that naturally occurs in the oil and gas reservoirs also typically flows into and through the production well to the surface as a byproduct of the oil and gas production process" (EPA 2016). [EPA. 2016. Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States. EPA-600-R-16-236Fa. Available at: https://www.epa.gov/hfstudy. Accessed February 20, 2018.]

3.3.1.5.2 Geothermal Resources

Rocks in the subsurface of the Earth are heated and become hotter with increased depth. This increase in heat with depth, the geothermal gradient, varies from place to place. If the geothermal gradient is high, groundwater in the pore space of the rocks can be heated to anomalous high temperatures. These heated waters occur in thermal springs and at the bottom of wells that have tapped the groundwater system. Heated subsurface waters constitute geothermal resources.

A region of known potential for geothermal resources occurs north of Carlsbad in the northwestern part of Eddy County. It is shown on Map 3-23 in Appendix B and on the New Mexico Geothermal Resources map (Laney and Brizzee 2003).

Several anomalous geothermal sites occur near Carlsbad and Malaga in the south-central part of the planning area, all in Eddy County. Two of the occurrences are springs, Indian Big Spring west of Carlsbad and Mosley Spring southwest of Carlsbad. A surface temperature of 28 degrees Centigrade (°C) was recorded for Indian Big Spring, and 20°C was recorded for Mosley Spring. Six other thermal wells were inventoried by the DOE, and bottom hole temperatures exceeded 50°C in two of these, one about 7 miles north of Carlsbad and one about 4 miles east of Malaga. The other four (one about 25 miles south of Carlsbad and the rest about 6 miles southeast of Malaga) had temperatures between 20°C and 50°C (Swanberg 1980).

The geothermal gradient in all of the wells is between 40°C and 50°C. Depth information was only available for one well. It was drilled to a depth of 4,380 feet and had a bottom hole temperature of 91°C (Swanberg 1980).

Past and Present Exploration, Development, and Production

The national programmatic EIS for geothermal resources was completed in 2008 (BLM 2008c). Among other things, it amended the existing Carlsbad RMP by allowing 186,375 acres to be leased for geothermal resources in the planning area (Map 3-23). The area open to leasing for geothermal resources roughly coincides with the area known to have potential for geothermal resources shown in Map 3-23 in Appendix B. However, records in the CFO indicate that no exploration drilling has occurred in the planning area nor have any geothermal leases been issued for the planning area.

No production of geothermal resources has occurred in the planning area.

Development Potential

An anomalous geothermal gradient in existing wells and the presence of a known potential area in the western part of the planning area indicate at least a moderate potential for the occurrence of geothermal resources. However, no exploration has occurred at any of the well sites nor in the known potential area.

Given the public emphasis on renewable energy resources, exploration for geothermal resources in the planning area is likely within the next 20 years. However, the lack of historical exploration suggests only low potential for the development of geothermal resources. If exploration occurs, it would likely be in the area of known potential in northwestern Eddy County.

No reserves of geothermal resources are known in the planning area.

Consequently, the potential for occurrence of geothermal resources is moderate in Eddy County and low in Chaves and Lea Counties. The potential for development is none in all three counties, except for the area shown in Map 3-23 in Appendix B and identified by Laney and Brizzee (2003), which has a low potential for development.

3.3.1.6 Solid Leasable Minerals

Solid leasable minerals include phosphate, coal, sodium, oil shale, potassium, Gilsonite, asphalt, and solid bitumen; sulfur in New Mexico and Louisiana; and hard rock minerals on acquired lands. However, only potassium, sodium, and sulfur occur in the planning area. Because none of the other solid leasable minerals occur in the planning area, they will not be discussed further.

Potassium deposits in the planning area are expansive, and the district east of Carlsbad is considered the most prolific producer in the United States, accounting for more than 75% of producer sales of potash in 2013 (Jasinksi 2014:122). Most deposits lie in the Secretary's potash area (see Map 3-17 in Appendix B); however, new deposits now are being developed outside the potash area (e.g., the Ochoa Project).

Sodium deposits in the planning area also are expansive (see Map 3-24 in Appendix B). The salt deposits locally are interbedded with potassium deposits, and some sodium is produced from potash tailings pond brines.

Sulfur occurs sporadically in small deposits in the southern part of Eddy County. These deposits have been explored periodically, but none have been produced.

3.3.1.6.1 Potassium

Potassium is an element that easily combines with other elements to form salts, carbonates, sulphates, nitrates, borates, or silicates. The term potash is the common name often used synonymously for various mined potassium compounds and potassium materials. In this document, "potassium" is used for the elemental resource and "potash" is used when referring to the product produced from the potassium deposits. "Sylvinite" or "mixed ore" refers to mixtures or groups of potassium minerals, including the mixture of sylvite and halite.

Potash is typically used as a fertilizer in the agricultural industry. It is also used as an industrial mineral or as a compound in the chemical industry.

Potassium-bearing mineral resources mainly occur in the planning area in the Permian Ochoan series of rocks of the Delaware Basin, namely in the McNutt Member of the Salado Formation. The Ochoan series includes the Castile, Salado, Rustler and Dewey Lake Formations in ascending order, which have a combined thickness of about 4,300 feet. Potassium minerals are interbedded in the stratigraphic sequence with other salts, sulphates, and carbonates. The composition consists largely of anhydrite and rock salt, but polyhalite, dolomite, limestone, and magnesite are present in moderate to small amounts. Both the Castile and Rustler Formations are distinctly poorer in rock salt and richer in anhydrite and carbonate rock than the Salado. They correspond in large measure to the lower and upper stages in a crude tripartite vertical transition from limestone and anhydrite, through rock salt and associated potash deposits, to anhydrite and dolomite. Of all the Ochoa evaporates, the Salado Formation is by far the most complex lithologically and structurally. A fine layering of anhydrite, polyhalite, halite, and claystone is characteristic of the formation, which depicts the cycles of flooding and desiccation during the deposition of the Salado (BLM 2014a).

The potassium-bearing minerals in the Salado Formation are interbedded or disseminated with the salt and occur in general at depths between 500 and 2,500 feet. The Salado Formation gently dips to the east-southeast, which attributes to the increase in depth of the potassium mineralization. The potassium minerals in the Ochoan rocks locally are concentrated enough to make them commercially valuable. The commercially available potassium minerals sylvite (chemical formula KCl) langbeinite—$K_2SO_4(MgSO_4)_2$—and Polyhalite—$K_2SO_4(MgSO_4)(CaSO_4)_2(H_20)$—occur in nearly horizontal beds in the McNutt Zone of the Salado Formation. Potassium deposits in the planning area are found in basin topography and tend to have karst features overlying portions of the deposit.

A large bedded potassium deposit occurs in the McNutt Zone of the Salado Formation from 11 miles to about 43 miles east of Carlsbad (Barker and Austin 1993:283). This deposit lies between Carlsbad and Hobbs and encompasses about 1,960 square miles (Prud'homme and Krukowski 2006:730).

Past and Present Exploration, Development, and Production

Potassium was discovered in the Delaware Basin in 1925, and production started in 1931. Exploration and production in the Delaware Basin have been continuous since. Since 1931, most potash production in New Mexico has come from the deposits east of Carlsbad. In the Carlsbad district, the Salado Formation contains sylvite, langbeinite, and lesser amounts of sulfate minerals in 12 potassium horizons.

The potassium ore is confined to the McNutt Zone of the Salado Formation in which local barren patches of almost pure halite complicate the mining operations (Prud'homme and Krukowski 2006:730).

The BLM currently administers potassium prospecting permits, leases, and mines in the planning area. As of November 13, 2013, approximately 140,839 acres were leased for potassium in the planning area in 127 leases (with three applications pending). Another 42,675 acres have been authorized for prospecting permits or exploration licenses (with seven applications pending). The location of leases and prospecting permits are in the potash district east of Carlsbad as shown in Map 3-25 in Appendix B. Most of the leases are within the area covered by Secretarial Order 3324 (77 *Federal Register* 71814), which provides for the orderly co-development of potassium and oil and gas resources. Prospecting permits are all located southeast of the Secretary's potash area.

The potash deposit administered by the BLM near Carlsbad is unique. The Carlsbad deposit is the largest deposit in New Mexico. It contains in part the only known commercial accumulation of langbeinite in the world. Approximately 95% of the potash produced from the Carlsbad potash district is used as agricultural fertilizer, and approximately 5% is used in the chemical industry. About 90% of the potash comes from federal land (Olsen 1993:39).

Four underground mines, including one in-situ mine, currently produce potash from leases in the Carlsbad District deposit. As of winter 2018, a fifth mine (ICP Ochoa Mine Project), which will target the mineral Polyhalite, has yet to complete the permitting process. The four producing mines are in the area encompassed by Secretarial Order 3324 (77 *Federal Register* 71814) (see Map 3-17). The proposed Polyhalite mine is outside of the Secretary's potash area and outside the Known Potash Leasing Area (KPLA). Areas within the KPLA are available for competitive leasing but are not available for non-competitive leasing. The four producing mines are targeting deposits consisting of two primary, soluble potassium minerals, sylvite and langbeinite, which are interbedded with halite (NaCl). Three of the mines are conventional underground room and pillar mines. The fourth mine is a solution mining operation at the site of an abandoned underground mine.

The three conventional underground mines produce an average of approximately 163,000 tons of sylvite and langbeinite ore per month. Recent potash production is shown in Table 3-23.

Table 3-23. Potash Production from the Planning Area, 2006–2010

Year	Sylvite		Langbeinite	
	Production (short tons)	Annual Change	Production (short tons)	Annual Change
2006	1,090,989	–	937,626	–
2007	1,208,097	11%	1,004,833	7%
2008	1,077,914	-11%	1,099,072	9%
2009	679,478	-37%	843,289	-23%
2010	1,013,958	49%	850,688	1%
5-year Average	1,014,087	–	947,102	–

Source: BLM 2014a:Table 2.4-15.

Development Potential

Based on historic market trends, the market demand for potash products is anticipated to gradually increase over time. Developed deposits in Canada provide potash to U.S. markets, which can affect demand for New Mexico potash; however, increasing demand on the world market would probably offset any market fluctuations.

Local production from each mine is not anticipated to increase greatly. However, new mining operations are expected to start up during the next 20 to 30 years. One project is currently proposed and in progress; the Ochoa Polyhalite (chemical formula $K_2Ca_2Mg(SO_4)_4 *2H_2O$) Project. The Ochoa mine is projected to yield a base case production of a total 843,000 tons per year, with a footprint of approximately 6,432 acres, and a mine life of 100 years or more (BLM 2014a). As of winter 2018, this mine project is still undergoing the permitting process.

New leases are anticipated to sell in the near future. One company is expected to expand its lease holdings (approximately 8,281 acres), and another company is expected to obtain preference right leases and eventually begin mining operations within 5 years (BLM 2014a).

Most of the new activity would be concentrated within or in the vicinity of the potash area encompassed by the 2012 Secretarial Order 3324 (77 *Federal Register* 71814).

The area encompassed by measured, indicated, and inferred reserves is considered to have high potential for development for the planning period. The area to the east and southeast of the Secretary's potash area encompassed by leases and prospecting permits is considered to have moderate potential for development. All other areas to the east and southeast of the high and moderate potential areas are considered to have low potential for development.

The Carlsbad potash deposit would be producing during the life of the RMP at current or increased rates of production. Therefore, the potential for occurrence and development of potash deposits in Eddy and Lea Counties is high. The potential for occurrence and development of potash in Chaves County is none.

3.3.1.6.2 Sodium

Sodium in the planning area occurs in the form of salt or halite.

Sodium mineral resources are widespread in the planning area, derived from the Ochoan series of rocks of Permian Age. Salt-bearing formations occur at the surface locally; however, the largest concentrations of salt are in the subsurface throughout the Permian Basin. The Salado Formation contains the largest concentrations. Salt deposits in the Salado vary from 0 to 1,500 feet thick and thicken toward the central part of the Delaware Basin where the Salado Formation can be as much as 2,450 feet thick. The Salado salt deposit dips to the southeast at about 3 degrees and is found at a depth from 400 to 1,800 feet in the planning area (Haigler 1962).

Past and Present Exploration, Development, and Production

Salt has been mined in the planning area as a byproduct of potassium mining since 1931. Total tonnage produced from the Delaware Basin is not available, but based on recent annual production, the total must be substantial.

The CFO currently administers one lease for sodium in the planning area, covering 40 acres. This lease is located in Section 20, Township 25 South, Range 37 East, New Mexico Prime Meridian, in the Delaware Basin near Jal, New Mexico.

No sodium prospecting permits are currently being processed for the planning area.

No natural mineable deposits of salt are found on the surface in the planning area. The bulk of the production of sodium is from tailings of the potash mines.

Salt is produced in the planning area in three different types of operations. One type of operation is solution mining in which unsaturated water is pumped down a well bore to dissolve the salt, then the saturated water (brine) is returned to the surface. The brine is used as an additive in oil and gas well drilling in the Permian Basin to control salt dissolution when wells are drilled through the Ochoan series rocks. Production varies by year; however, the single lease on BLM-administered land is currently not producing.

The general volume of salt sales from the planning area during the last few years is not available.

Development Potential

The production of sodium varies with the economy and the weather. The weather plays a vital role because the most frequent use of salt from the planning area is for road de-icing. Consequently, the demand for salt is largely dependent on the weather. Production of salt for this use would vary by year.

The production of brine salt would remain steady because it is dependent on steady drilling activity in the Permian Basin. Drilling activity in the basin is expected to remain stable or slightly increase.

No reserve information is available for the sodium deposits in the planning area; however, the salt deposits are extensive (see Map 3-24 in Appendix B), and mining in the planning area likely would continue well beyond the life of the RMP.

Consequently, the potential for development of sodium is high in Eddy and Lea Counties and non-existent in Chaves County.

3.3.1.6.3 Sulfur

Native sulfur (chemical symbol S) is a yellow solid element used extensively in various industrial processes, pharmaceuticals, and the chemical industry.

Elemental sulfur is common in rocks of Ochoan age in the Delaware Basin in southwestern Eddy County. The biogenic native sulfur deposits are found in altered carbonate and evaporite strata. The deposits are associated with narrow, northeast-trending grabens and normal faults that disrupt the gently tilted, east-dipping Upper Permian evaporate succession. The sulfur deposits are restricted to geologic traps in the fractured and dissolution-modified down-faulted blocks of the grabens. The sulfur zones consist of sulfur within vuggy limestone and are overlain by a clay-rich unit that probably acted as an important seal for the sulfur-generating system. The sulfur zones occur at or near the base of the Castile Formation. Other parallel, regionally distributed grabens and normal faults are commonly the sites of non-commercial sulfur deposits and genetically related secondary replacement limestone bodies (BLM 2014a).

One occurrence in the planning area is the Leonard Minerals sulfur strike in the Yeso Hills in the southwestern part of the planning area near the head of the south fork of the Black River. Other locations are possible where the Castile Formation is exposed at or near the surface. Map 3-26 in Appendix B shows the extent of exposures of the Castile Formation where exploration for sulfur would be concentrated.

Byproduct sulfur from oil refineries, gas processing plants, and metal smelters is a “nondiscretionary byproduct,” meaning that the sulfur recovery is mandated by environmental regulations put in place to prevent air pollution. Because the sulfur must be removed as a cost of producing the primary product, the sulfur byproduct is typically sold, even at a price lower than the cost of recovery. This has enabled byproduct sulfur to drive other forms of sulfur production, notably extraction from underground deposits, out of the market in the United States.

Past and Present Exploration, Development, and Production

No sulfur has been mined in the planning area; however, extensive exploration activities occurred in the past. Sulfur has been extensively mined to the south of the planning area in Culberson County, Texas.

Currently, no lands are leased for sulfur, and no exploration licenses or prospecting permits for sulfur are pending in the CFO planning area.

Development Potential

Periodic exploration for sulfur may occur in the planning area; however, no mining operations are anticipated because of the lack of recent activity and the low economic viability.

The potential for occurrence of sulfur in Eddy County is high but low in both Chaves and Lea Counties. The potential for development is low in all three counties. It is not likely that competitive leases will be issued in the near future.

3.3.1.7 Locatable Minerals

Potential locatable minerals that may occur in the planning area include gypsum, semiprecious gem stones, copper, gold, uranium, and limestone or dolomite. The occurrence of locatable mineral resources in the planning area is limited. Exploration for locatable mineral deposits has occurred in the planning area since the late 1800s; however, very little production of locatable minerals has occurred in the planning area.

Currently, only one active mining claim is located in the planning area. It is located on a selenite gypsum deposit.

3.3.1.7.1 Gypsum

Gypsum is the most prevalent and primary locatable mineral in the planning area. It occurs in the evaporite rock sequences exposed at the surface. Specimen quality selenite occurs at the Crystalline Phoenix Mine along a gypsum outcrop in southwestern Eddy County in the Yeso Hills about 3 miles north of the Texas state line in the NE¼ of Section 14, Township 26 South, Range 24 East, New Mexico Prime Meridian (BLM 2014a). Selenite occurs in Eddy County at K Hill in the S½ of Section 13, Township 26 South, Range 24 East, in a solution collapse breccia. Excavations exist at both deposits. Large crystals up to 18 feet long occur in the trench in the Yeso Hills. Local individuals still use some of the selenite for landscape stones (Crawford 1993:10).

Past and Present Exploration, Development, and Production

Gypsum was open pit mined from 1905 to 1923 from a mine in Section 18, Township 20 South, Range 27 East, New Mexico Prime Meridian, about 12 miles north of Carlsbad. The gypsum was used as plaster. The gypsite was quarried from the Permian Yates Formation, and the poor quality probably caused the closure of the mine (McLemore 1993:80).

High purity gypsum was extracted from the Yeso hills locality during World War II for use in capacitors (Crawford 1993:10), but production figures are not available.

The Crystalline Phoenix selenite gypsum mine is an unpatented lode mining claim adjacent to mile marker 7 on U.S. Highway 62/180 (commonly known as the National Parks Highway). It is a small surface operation that requires no processing or refining, only extraction and transportation. It is an active mining plan of operation. The principal use of the gypsum mined from this claim is for specimens for mineral collections (BLM 2014a). No production information is available for this mine.

Development Potential

The mining and production of locatable minerals in the planning area is expected to remain at the levels experienced today on lands open to mineral entry. The demand for mineral specimens would vary with the economic cycles; however, production is not expected to increase over current production levels. Gypsum mines in the planning area have a cyclic history of production and shut down. This cycle is expected to continue for the planning period (BLM 2014a).

The potential for occurrence of gypsum in Eddy County is moderate. The potential for development of mineral specimen deposits is high for one locality in Eddy County. However, the potential for development of gypsum elsewhere in the planning area is low.

3.3.1.7.2 Semiprecious Gemstone

Semiprecious gemstones occur sparsely in the planning area. Turquoise occurs at a locality about 10 miles east of Artesia; and barite, celestite, selenite, and calcite nodules occur in the Bell Lake Sink, a collapse breccia, in Section 9, Township 24 South, Range 33 East, New Mexico Prime Meridian, in Lea County (Hill 1993b:317).

Past and Present Exploration, Development, and Production

No information is available for past or present production of semiprecious gemstones in the planning area. Exploration has been sporadic.

Development Potential

The demand for semiprecious gemstones would vary with the economic cycles; however, the sporadic exploration and production is not expected to change during the planning period.

Both the potential for occurrence and potential for development for semiprecious gemstones is low in all three counties in the planning area.

3.3.1.7.3 Copper

Sedimentary copper deposits occur on state-administered land about 5 miles west of Carlsbad. The copper was found in a small deposit of malachite (Golden Eagle Mine). The deposit is located along an anticlinal feature trending approximately parallel to the reef front (BLM 2014a).

Past and Present Exploration, Development, and Production

Copper was commercially mined in a limited capacity on state lands in the planning area in the past, but in limited quantities (Golden Eagle Mine). A prospect mine is located on USFS-administered lands in the planning area. An adit about 30 feet long was mined. There are several small mines on NPS-administered lands just across the state line in Texas (outside the planning area). These mines were commercially operated in the late 1800s. Although outside the planning area, their presence suggests other small deposits may be present in the planning area. No other mining operations are currently ongoing or planned (BLM 2014a). No active mining claims for copper exist in the planning area.

Development Potential

The development of new small-scale mines for copper is not anticipated in the planning area even though the commodity price for this metal has recently significantly increased. The deposits in the area are very small, and the nature of the occurrences of these minerals does not suggest the presence of large commercial deposits (Curnutt 2011:29). Thus, the potential for development of copper deposits is low in all three counties in the planning area.

3.3.1.7.4 Gold

Gold was prospected in the planning area; however, no occurrences are known (BLM 2013). Precious metals may be associated with massive sulfide deposits, and prospecting most likely was around the massive sulfide deposit prospects that occur around the margin of the Delaware Basin in the Guadalupe Mountains. These deposits were examined by Hill (1993a).

Past and Present Exploration, Development, and Production

No active claims for gold exist in the planning area. Past activities consisted only of exploration. No commercial deposits were developed (BLM 2014a).

Development Potential

The lack of recent exploration even though the price of gold has significantly increased suggests no or low potential for the occurrence of gold in the planning area. Neither exploration nor development is anticipated during the planning period. Thus, the development potential for gold is low in all three counties.

3.3.1.7.5 Uranium

Scattered uranium deposits occur in the planning area. Only two occurrences have been noted that can be considered uranium prospects, one in Eddy County and one in Lea County (Waltman 1954:113). The prospect in Eddy County is located in the SE¼ of Section 26, Township 21 South, Range 24 East, New Mexico Prime

Meridian, in Rocky Arroyo. The mineral occurrence is in the Yates Formation. The black uraniferous hydrocarbon in streaks, pellets, and pockets is probably thucholite. Similar occurrences show up on well logs in the subsurface Yates sand and dolomite section. The prospect in Lea County is located in Section 24, Township 19 South, Range 35 East. The deposit was found in a mineral materials pit in a red Tertiary clay. Grade was 0.006% uranium oxide, and data indicated no lateral continuity or continuity at depth.

Past and Present Exploration, Development, and Production

In 1954, more than 450 mining claims were filed in Eddy County near the site of the uranium prospect in Rocky Arroyo. Grade was less than 0.1% uranium oxide, and the prospect never produced (Waltman 1954:113). No active claims for uranium exist in the planning area. Mining claims have been filed in the past; however, no activities other than exploration have occurred. No commercial deposits were found or developed (BLM 2014a).

Development Potential

The development of new small-scale mines for uranium is not anticipated in the planning area, even though the commodity prices for these materials have recently significantly increased. The deposits in the area are very small, and the nature of the occurrences of these minerals does not suggest the presence of large commercial deposits (Curnutt 2011:29). Thus, the potential for development of uranium deposits is low for all three counties in the planning area.

3.3.1.7.6 Limestone and Dolomite

Large quantities of limestone occur in the western part of the planning area. Prospecting for limestone and dolomite for use in the chemical industries has periodically occurred. However, no active claims for limestone or dolomite exist in the planning area. Mining claims have been filed in the past; however, no activities other than exploration have occurred. No commercial deposits were found or developed (BLM 2014a).

Past and Present Exploration, Development, and Production

Past activities for limestone or dolomite deposits consisted only of exploration. No commercial deposits were developed (BLM 2014a).

Development Potential

Although limestone and dolomite deposits are widespread in the western part of the planning area, no development has occurred. Thus, development of these deposits is not anticipated during the planning period. The potential for occurrence is high in Eddy and Chaves Counties and low in Lea County. However, the potential for development is low in all three counties.

3.3.1.8 Salable Minerals

Salable mineral resources in the planning area include caliche, borrow material, sand, gravel, stone, clay, and petrified wood. All commodities are disposed under the Materials Act of 1947 as amended and sold or granted in free use by weight (pounds or tons) or volume (e.g., bank cubic yards). Caliche, sand, gravel and borrow material, stone, and clay make up almost all of the commodities disposed in the planning area and are described below. Petrified wood requests are very rare and typically casual use, so petrified wood is not discussed further.

Numerous sites are available for the production of mineral materials in the planning area. The sites are classified as negotiated pits, community pits, free use pits, and common use areas. The distribution of mineral materials sites is shown in Map 3-37 in Appendix B. New pits and quarries are opened as sales are made, and older pits and quarries are reclaimed when no longer in use. Therefore, the numbers of sites changes during any given year. In November 2013, the planning area contained 98 community pits, 99 negotiated pits, 42 free use pits, one common use area, and 48 pits of unknown origin that are not yet reclaimed. The volumes of all commodities for Fiscal Years 2011 through 2013 are shown in Table 3-24.

Table 3-24. Recent Mineral Material Production in the Planning Area for Fiscal Years 2011–2013

Mineral Material	2011	2012	2013
Caliche	908,970	863,557	675,224
Gravel/borrow	455,918	366,529	57,705
Sand	8,882	325,971	2,946
Clay	8,084	103,526	0
Stone	17	32	14

Note: All units are in bank cubic yards except for stone, which is in short tons.
Source: CFO data files.

A community pit is established to accommodate multiple public users who produce a particular type of commodity in a given area. A negotiated pit accommodates one or more producers that have entered either competitive or non-competitive contracts for mineral materials. Free use pits are for government and non-profit organization use. A common use area typically is an area of large lateral extent established to accommodate multiple users.

Mineral material pits and quarries are established mainly on lands where the BLM manages both the surface and mineral estates, although pits can be opened on split estate with only federal mineral estate. The pits are generally located no more than 5 to 10 miles apart. The distance between pits is kept at a minimum to reduce transportation costs related to moving the material. An earnest attempt is made to locate pits where no other resources are adversely affected (BLM 2014a).

Mineral materials are sold or disposed under sales contracts or free use permits. Sales can occur from community pits, negotiated pits with multiple users, negotiated pits exclusively for the use of one user, or from common use areas. Free use to government and non-profit organizations can be permitted in exclusive free use pits, community pits, or from common use areas. The types and numbers of contracts and permits vary from year to year depending on the demand for particular commodities. Table 3-25 shows the numbers of contracts and permits recently issued in the planning area.

Table 3-25. Number of Mineral Material Contracts and Permits by Pit Type for Fiscal Years 2011–2013

Pit or Quarry Type	2011	2012	2013
Exclusive pits	316	342	297
Community pits	315	239	184
Free use pits	5	8	3
Common use areas	12	10	9
Total	***648***	***599***	***493***

Source: CFO data files.

The principal mineral material commodities are described below.

3.3.1.8.1 Caliche

Caliche is a rock that occurs near the surface and consists of gravel, sand, silt, or clay cemented with carbonates, silica, or gypsum. It is typically very hard and impermeable. It forms from cementation of various soil types that occur in the planning area.

Caliche is considered a salable mineral, and contracted operators pay by volume extracted, generally loose cubic yardage. It is the primary mineral material sold in the planning area. Two types typically occur in the planning area, caliche cemented with carbonate and caliche cemented with gypsum. The gypsiferous caliche typically is undesirable for the projected end use, so the carbonate caliche makes up almost all of the sales of caliche.

Caliche usually is crushed and is typically used to surface roads in the oil and gas fields, for surfacing oil and gas well pads, and for other road construction activities (Curnutt 2011:31).

Caliche is widespread in the planning area but is most common east of the Pecos River valley on the Mescalero pediment. The Pecos Valley section of the Great Plains province is characterized by numerous mounds of windblown sand. This sand is underlain by a layer of calcium carbonate material, the Mescalero caliche, which is typically considered to indicate slope stability. The Mescalero caliche is found over much of the Pecos Valley drainage area.

In northern and central Lea County, on the eastern and high plains, caliche forms the base of the Llano Estacado. However, desirable caliche occurs only sporadically in the southern part of Lea County. In eastern Eddy County, caliche forms caprock ledges and the tops of low hills (Mescalero caprock). In western Eddy County, caliche forms on the Orchard Park and Blackdom river terraces above the Pecos River. Caliche is rare in Chaves County except in erosional cuts where river terraces are exposed (Lofton 2012).

Past and Present Exploration, Development, and Production

Caliche has been used for road and well pad construction in the planning area since the oil fields began production; however, it has been sold by the BLM only since the late 1940s after passage of the Materials Act of 1947. Historic production data are not available.

Recently, caliche sales make up about 75% of the mineral material sales in the planning area. Invariably, by volume, more caliche is sold than any other commodity, although the percentage by volume of other commodities varies from year to year.

The acreage encompassed by all caliche pits in the planning area is unknown; however, since the 1988 RMP, pits have been permitted to maximize use and minimize surface disturbance by discouraging development of new pits close to one another. Pits are permitted to support multiple needs. Currently, pits as large as 660 feet square have been permitted to accommodate multiple users. Fewer, larger pits equate to less overall surface disturbance. Additionally, pits are prohibited in lesser prairie-chicken habitat (BLM 2014a).

Development Potential

The use of caliche generally has increased in the past few years even though production from BLM-administered land has fallen since 2011. It is expected to increase over the next 20 to 30 years. Caliche is the primary mineral material mined and sold in the planning area.

Oil and gas exploration and production activities are the drivers for caliche demand. The numbers of well pads and the connecting roads have been increasing each year, requiring caliche for construction of the pads and continual maintenance of the roads. The trend in oil and gas development is expected to continue, so the demand for caliche would continue to rise (BLM 2014a).

Consequently, both Eddy and Lea Counties have high potential for occurrence and high potential for the development of caliche. The potential for occurrence and development of caliche in Chaves County is moderate.

3.3.1.8.2 Sand

Sand is rock material with grain sizes that vary from 1/16 millimeters up to about 2 millimeters in diameter. Sand deposits are widespread in the planning area.

Sand comes from two sources, as a byproduct of the mining of gravel and from wind-blown deposits (blow sand). Sand from gravel deposits occurs along the Pecos River valley and in the arroyos and stream beds in the foothills of the Guadalupe Mountains. Wind-blown sand deposits are common on the Mescalero pediment east of the Pecos River valley (BLM 2014a).

The main uses of sand are surfacing material when roads are oiled; bedding material for oil and gas pipelines; as fill material in the reclamation of reclaimed sites and leveling of oil pads; absorbent for oil, antifreeze, and battery acid releases; sandblasting; and other general construction projects (Lofton 2012).

Past and Present Exploration, Development, and Production

Historic exploration and production data are not available for sand deposits in the planning area.

Currently permitted sand pits are all located east of the Pecos River valley in Eddy County. Other suitable pit locations exist in Lea County; however, currently most pits are developed on non-split estate lands. Most sand pits in Lea County exist on private surface and private mineral estate. Sand pits can be developed on the split estate lands; however, CFO policy has been to permit split estate lands only if the BLM enters a surface owner's agreement. Typically, the BLM attempts to permit sand pits where no other resources would be adversely affected.

The volume of sand produced in the last few years has varied. Recent production of sand is shown in Table 3-24 above.

Development Potential

Demand for sand is driven by economic growth in the surrounding area. Oil and gas drilling and potash mining are expected to expand or at least remain stable for the life of the RMP. Expansion of natural gas collection and distribution systems likely would increase the demand for sand in the planning area. Overall, the expansion of the oil and gas and potash industries would create more demand for sand.

Consequently, the potential for occurrence and development of sand in Eddy and Lea Counties is high. The potential for occurrence in Chaves County is moderate, and the potential for development is low.

3.3.1.8.3 Gravel/Borrow

Gravel is rock material with a particle size greater than about 2 millimeters in diameter. Borrow material is included in this category.

Gravel in the planning area typically is in the form of limestone cobbles along stream beds at the foot of the Guadalupe Mountains, limestone that is mined and crushed to make gravel products, or deposits along the Pecos River. Gravels are generally concentrated in stream beds or in stream bed deposits. A number of gravel pits are located in the area west of the Pecos River along the base of the Guadalupe Escarpment. However, most of the areas where gravel has concentrated along the Pecos River are on private surface and mineral estate. Consequently, gravel deposits on BLM-administered lands are very limited (BLM 2014a).

Several areas exist where solid limestone deposits could be mined and crushed for gravel. These areas are west of the Pecos River and north of Dark Canyon. Areas south of Dark Canyon are limited due to visual resources conflicts and the proximity to Carlsbad Caverns National Park.

Gravel typically is crushed to make gravel products. The main use of gravel is in aggregate in making concrete and asphalt, although some gravel is used for oil well pad construction (Lofton 2012) and landscaping.

Borrow material is included with gravel for purposes of discussion. Borrow material refers to loosely consolidated dirt with clast sizes that vary from clay to gravel. Borrow is a catch-all term for material that does not fit into a well-defined mineral material category. It occurs sporadically throughout the planning area.

Borrow typically is used for fill material for oil and gas pads and road construction. It typically is used in the same form as it is extracted, i.e., it is not screened nor crushed.

Past and Present Exploration, Development, and Production

No historic exploration or production data are available for gravel or borrow in the planning area.

One company operates a gravel pit along the edge of the caprock in Lea County. This material is not a very good quality but is the best in the local area.

The volume of gravel and borrow produced in the last few years has varied. Recent production of gravel and borrow is shown in Table 3-24 above.

Development Potential

Demand for gravel is driven by economic growth in the surrounding area. The use of gravel in the recent past has expanded even though the production from BLM-administered land has varied. Several large highway construction projects have been completed or are currently ongoing. General construction activity has also increased. Construction projects utilizing concrete consume large quantities of gravel (BLM 2014a).

Additionally, continued expansion of the oil and gas and potash industries in the Carlsbad area and construction of homes and infrastructure would continue to increase the demand for gravel and borrow.

Consequently, the potential for occurrence of gravel and borrow in Eddy County, Lea, and Chaves Counties is high. The potential for development is high in Eddy and Lea Counties and slightly lower for Chaves County. Because the number of deposits on BLM-administered land is limited, development is likely wherever the deposits occur.

3.3.1.8.4 Stone

Stone includes slabs of all sizes of rock and boulders.

Stone is found in the western portions of Eddy County and Chaves Counties at outcrops of sedimentary rocks. Typically in the planning area, stone is limestone or limey sandstone.

Travertine occurs along Cottonwood Creek, Rocky Arroyo, and the Rio Peñasco in Eddy County. Smaller deposits occur at Blue Spring and along the Black River and other drainage channels. In Rocky Arroyo and in Sitting Bull and Last Chance Canyons, the travertine deposits are up to 30 feet thick (Hendrickson and Jones 1952:25).

Stone is used for riprap, residential construction, landscaping, stone walls, and other building projects.

Past and Present Exploration, Development, and Production

Massive limestone has been mined from the limestone deposits of the Guadalupe Mountains. This material is used for riprap for construction projects in the area. However, production data are not available.

Currently, the BLM administers two quarries and one common use area for stone. The common use area was established for stone in the Indian Basin area in Township 21 South, Range 23 East, New Mexico Prime Meridian. It encompasses about 12,960 acres (Lewis 2011; Lofton 2012).

The quantity of stone used is somewhat unpredictable. Most of the stone mined in the planning area is used for residential construction. The use of building stone in homes is highly variable, and because the total quantity of material is fairly small, one relatively large contract would skew the trend. The number of contracts for building stone varies between three and 12 per year.

The production of stone has varied in the planning area in the last few years. Table 3-24 above shows recent production.

Development Potential

Demand for stone is driven by economic growth in the surrounding area. Oil and gas production and potash mining are expected to expand or at least remain stable for the life of the RMP. This economic stimulating activity would create more homes and infrastructure, so the demand for stone would rise.

The potential for occurrence of stone is high in Chaves and Eddy Counties and low in Lea County. The potential for development is high in both Chaves and Eddy Counties and low in Lea County.

3.3.1.8.5 Clay

Clay includes rock materials typically called silt or clay with particle sizes of less than 1/16 millimeter in diameter. Clay of good quality would typically have a particle size less than 1/256 millimeter in diameter.

Clay is found in a number of formations interbedded with evaporite rock sequences in Chaves, Eddy, and Lea Counties.

Clays that expand in the presence of water (e.g., montmorillonite) are used as liners for landfills, lagoons, and water ponds (tanks) and as reserve pit caps in the oil and gas fields (Lofton 2012).

Past and Present Exploration, Development, and Production

Clay is found in several places in the planning area, but only one deposit is of a sufficient quality and quantity to be economically mined. This deposit is being mined by a company in Lea County (BLM 2014a).

Recent production of clay is shown in Table 3-24 above. The volume of clay produced has varied markedly from year to year.

Development Potential

Demand for clay is driven by economic growth in the surrounding area. Oil and gas drilling and potash mining are expected to increase or at least remain stable for the life of the RMP, so the demand for clay most likely would remain stable as well.

Chaves, Eddy, and Lea Counties have a high potential for the occurrence of clay deposits; however, the development potential is low in all three counties because of the poor quality of the deposits. Only the one deposit in Lea County is expected to produce during the life of the RMP.

3.3.2 Renewable Energy

The planning area may have considerable potential for the development of renewable energy (e.g., wind, biomass, solar, and geothermal). BLM policy is to accommodate environmentally sound development of renewable energy projects. Applications for commercial renewable energy projects are processed as ROW authorizations under Title V of FLPMA and under 43 CFR 2800.

On August 8, 2005, President Bush signed the National Energy Policy Act of 2005 (42 USC 149 § 15801, et seq.). The legislation promotes dependable, affordable, and environmentally sound production and distribution of energy for America's future.

3.3.2.1 Biomass

In the planning area, the forecast for biomass resources is very slim because of the scarcity of densely vegetated areas; however, potential could exist for the construction of biomass facilities for processing and burning. Virtually no areas within the planning area contain biomass resources for energy production; as a result of arid conditions, biomass may not be as sustainable in the planning area as in other areas. Due to the low potential, biomass resources are not discussed further.

3.3.2.2 Geothermal

Potential for geothermal resources in the planning area is virtually the same as that of biomass. The nationwide Geothermal Resources Leasing Programmatic Environmental Impact Statement (EIS) and Record of Decision (BLM 2008c) amended the 1988 CFO RMP and allocated approximately 186,375 acres within the planning area as open to geothermal leasing (see Map 3-23 in Appendix B). There has been no interest expressed in geothermal leasing within the planning area since the programmatic decisions were promulgated, and there are very little data that suggest the area would see any interest in leasing, due to the lack of oil and gas wells within the potential area showing positive signs of significant geothermal heat.

3.3.2.3 Wind Energy

BLM-administered lands in the planning area provide opportunities for wind energy development. A 2003 study by the BLM and DOE found several locations of "good" to "superb" wind potential, located on higher elevations in the western portion of the planning area (BLM and DOE 2003). The wind energy potential maps were developed using data from the National Renewable Energy Laboratory (NREL), which is operated by the Alliance for Sustainable Energy, LLC, for the DOE. The maps show the renewable energy potential for wind power in the CFO (see Map 3-28 in Appendix B).

Private companies have expressed interest in developing potential sites in Eddy and Chaves Counties, and are currently evaluating the suitability of wind under site testing and monitoring authorizations. No development permits have been issued.

In October 2003, the BLM initiated the preparation of a Wind Energy Development Programmatic EIS to address the impacts of the future development of wind energy resources on public lands. The NREL assisted the BLM in the preparation of the Programmatic EIS and provided an inventory assessment of wind energy resources on BLM-administered lands in the western United States. Appendix B of the Final Programmatic EIS contains CFO Boundaries Maps (B-89), which show wind resources consistent with utility-scale production (BLM 2005b). The majority of the CFO jurisdiction is categorized as having marginal to fair potential for wind energy, with some localized areas that are categorized as having good to superb potential (NREL Wind Resource Potential Map of the U.S., January 23, 2008). The majority of this good to superb potential area is west of Carlsbad, along the ridge of the Guadalupe Mountains in western Eddy County, as well as in a small portion of southwestern Chaves County (see Map 3-28 in Appendix B).

Wind resources are classified based on the wind power density in units of watts per square meter of surface land area. Wind power is dependent on the height of the wind turbine above ground level. The current commercial standard is 150 feet. Effective NREL wind power classes range from lowest (Class 1) to highest (Class 7). Wind power is considered economic for large utilities-scale turbines at Class 4 and higher for short-term operation and Class 3 and higher for long-term operation, although a small non-commercial turbine can be viable at Class 1.

A report prepared by the BLM and DOE identified lands within the planning area as having minimum acreage with high-potential wind power density (BLM and DOE 2003). The majority of the planning area falls into wind power density Class 2 (marginal) and Class 3 (fair), but there are a few high-elevation sites that fall into Class 5 (excellent), Class 6 (outstanding), and Class 7 (superb) (NREL Wind Resource Potential Map of the U.S., January 23, 2008).

The 2005 Wind Energy Development Programmatic EIS amended the 1997 Carlsbad RMPA to provide direction for wind energy development in the planning area, including areas recommended for development. The BLM and DOE survey of topographic and historical wind conditions further identified locations in the planning area where wind resources are available for development (see Map 3-28 in Appendix B). The criteria for selecting those locations include the following:

- The wind resources are limited to areas in wind power density Class 3 and higher.
- The site is within 25 miles of transmission lines of 69 to 345 kilovolts (kV) capacity.
- The site is within 50 miles of a major road or railroad.
- The land use is compatible with BLM management of other resources.

Historically, the CFO administered 3 testing authorizations for Wind Energy. These types of permit allowed companies to construct meteorological towers to collect wind and other weather data to determine if an area had potential for wind development. Currently, there is a proposal for testing authorization on BLM-administered lands within the planning area. There are no existing commercial wind energy facilities on BLM-administered lands within the planning area. Private companies are also exploring the potential for wind on private land in Lea County, but the development activity appears to be greatest in Roosevelt and Curry Counties.

3.3.2.4 Solar Energy

The report prepared by the DOE and the BLM identified lands within the planning area as having large acreage with high potential concentrating solar power (CSP) or photovoltaic (PV) (BLM and DOE 2003). Solar energy is a renewable energy resource that has excellent potential for generating electricity in the planning area. Solar energy resources are classified based on the amount of solar radiation that contacts the ground surface in a specified area. Solar radiation is measured in units of kilowatt-hours per square meter per day. The amount of solar energy available at a specific location varies with latitude, season, and time of day. The energy output also depends on the type of solar energy collector being used. Two types of collectors are considered for renewable solar energy generation: CSP and PV.

CSP plants are large systems that use mirrors to focus sunlight to create high temperatures. The high temperatures generated by focused sunlight heat fluid to generate electricity. Facilities include a solar collection system, a system for transferring the collected energy to a working fluid or to a storage system, and a system for converting the thermal energy such as a turbo-generator.

PV is a solar energy collection system consisting of flat plates of solar-energy-collecting PV cells. The collection system may be equipped to track the sun throughout the day. The PV cells are connected to storage batteries that are charged during daylight hours.

Solar energy values in the planning area range from 5.6 to 6.5 kilowatt-hours per square meter per day for PV collection systems and 5.5 to 7.5 kilowatt-hours per square meter per day for CSP collection systems. There are no commercial solar energy facilities currently on public lands within the planning area. Very small-scale PV systems exist as part of other infrastructure (e.g., water storage systems, communication towers) where power needs are minimal and distance to other power sources is not economical.

3.3.3 Livestock Grazing

The BLM is responsible for managing livestock grazing on BLM-administered lands in the planning area. Livestock grazing includes the grazing of domestic cattle, sheep, goats, and horses. Livestock grazing in the planning area is governed under either Section 3 or Section 15 of the Taylor Grazing Act. Section 3 concerns issuing grazing permits on federal lands within the original grazing district boundaries that were established by the Taylor Grazing Act of 1934; the BLM sets the livestock numbers for all lands (federal, state, private, etc.) within these allotments. Section 15 deals with those lands that fall outside that boundary; the BLM only determines livestock numbers for federal acreage within these allotments. The amount of forage required by one animal unit (cow with calf pair) for one month is called an animal unit month (AUM). Management practices for livestock grazing are assessed using the Standards and Guidelines, which bridge the health of the public lands to the occurring multiple uses.

3.3.3.1 Current Conditions

3.3.3.1.1 Animal Unit Month Allocations

The CFO manages livestock grazing on 1,947,890 federal acres, 88% of the planning area (see Map 3-29 in Appendix B). This acreage incorporates 199 Section 3 grazing permits and 66 Section 15 grazing leases, authorizing approximately 367,656 active AUMs of livestock forage in 265 grazing allotments (Table 3-26). Active use is defined as the current authorized use, including livestock grazing and conservation use. Active use may constitute a portion, or all, of permitted use. Active use does not include temporary non-use or suspended use of forage within all or a portion of an allotment. Permitted use means the forage allocated by, or under the guidance of, an applicable land use plan for livestock grazing in an allotment under a permit or lease and is expressed in AUMs. Permitted AUMs are attached to a base property on BLM allotments; base property is defined 1) land that has the capability to produce crops or forage that can be used to support authorized livestock for a specified period of the year or 2) water that is suitable for consumption by livestock and is available and accessible, to the authorized livestock when the public lands are used for livestock grazing (43 CFR 4110.0-5). These lands are located in Eddy, Lea, and Chaves Counties. The CFO manages a small number of Section 15 allotments in Otero County, and the new CFO land use plan would make decisions concerning grazing for these lands.

Table 3-26. Allocated Animal Unit Months in the Planning Area

Livestock Type	Active AUMs
Section 3 permits	349,525
Section 15 leases	18,131
Total	***367,656***

Source: BLM 2010a.

Almost all livestock grazing within the planning area is permitted for year-round use. Permitted livestock numbers for each allotment are set at levels that provide for plant recovery to enhance rangeland health. These levels have been determined by quantitative measurements of forage present. When rangelands are not meeting resource objectives, changes in grazing management are implemented, including adjusting permitted livestock numbers, adding additional waters and fences, or providing rest in certain pastures during the growing season. The actual use on CFO grazing allotments for the last 12 years is listed in Table S.22, Appendix S. Actual use is defined as the number of AUMs actually using the public lands, which may change from year to year.

3.3.3.1.2 Selective Management Categorization

The BLM recognizes that AUM production on its rangelands can only be sustained with proper management of livestock grazing activities. To evaluate rangeland health and keep AUM production sustainable, the BLM complies with the Standards and Guidelines (BLM 2001a). In 1985, all allotments were placed in categories established by BLM range management policies. These categories included Improve (I), Maintenance (M), and Custodial (C) (see Table S.23, Appendix S). Priority for range improvement funds and monitoring are given to the 'I' category allotments followed by the 'M' category allotments and then the 'C' category allotments.

The number of allotments and their category for the CFO are listed below (Table S.24 and Table S.25). Appendix F includes tables detailing each allotment in the planning area with current allotment categorization, AUMs, season of use, type of management, active use, suspended use, and kind of livestock.

3.3.3.2 Forecast

Implementation of the Standards and Guidelines (BLM 2000) has helped to improve rangeland condition in the planning area. The Standards and Guidelines, along with an active rangeland monitoring program, ensure that the rangelands in the planning area remain healthy or are making progress towards achieving standards. When allotments are not meeting standards or resource objectives, AUMs or grazing systems may be adjusted to improve rangeland health. Drought conditions and uncharacteristic wildfire would continue to threaten rangeland health. The future livestock grazing management would be determined according to precipitation and the corresponding condition of native and desirable upland and riparian species, riparian PFC, and overall biotic health. Increased demand from other resources may result in new challenges and opportunities in grazing management. These new demands may arise from the decrease of forage available for livestock use originating from expanded mineral development or from the need to meet habitat requirements for special status species.

3.3.3.3 Key Features

Standards address the health, productivity, and sustainability of the BLM-administered rangelands and represent the minimum acceptable conditions for the public rangelands. Their application would be determined as resource-specific guidelines are developed. Standards are synonymous with goals and are observed on a landscape scale. They describe healthy rangelands rather than important rangeland byproducts. The achievement of a standard is determined by observing, measuring, and monitoring appropriate indicators. An indicator is a component of a system whose characteristics (e.g., presence, absence, quantity, and distribution) can be observed, measured, or monitored based on sound scientific principles.

RHAs are used to take a qualitative look at the indicators of rangeland health. The three indicators that are assessed are hydrologic function, soil/site stability, and biotic integrity. The RHAs are used to provide a general view of current conditions and are not used as a sole source of information in determining management decisions. An RHA is performed along with BLM grazing permit renewals and brush management projects, giving the CFO a snapshot of rangeland health every year. On average, approximately 80% to 90% of these assessments show the land to be meeting the standards of rangeland health.

The type of ecological range sites in the area are influenced by soils, precipitation, and temperature. Each range site is capable of producing a certain kind of vegetative community. The amount of forage available to sustain a viable grazing operation is directly related to the type of vegetative community at each site. Section 3.2.4 above details vegetation information and acreages for the planning area. Grazing allotment information for all 269 allotments within the planning area is shown in Map 3-29 in Appendix B. The location of the allotments is shown on Map 3-30 in Appendix B.

Allotments within the I category would be considered key features, as additional management activities are required to improve the public land health in these areas.

3.3.3.4 Range Improvements

Approximately 10% of the BLM-administered grazing allotments in the planning area are assessed annually. Where livestock grazing has been identified as contributing to an allotment not meeting the rangeland health standards, allotment-specific guidelines are implemented to improve rangeland condition. The goal is to continue sustainable livestock use on public lands while maintaining healthy watersheds and providing habitat for wildlife.

Range improvement projects are implemented to assist in achieving management goals. Those developed prior to the 1960s were financed by the grazing lessees. Later, the BLM contributed money toward projects and in some cases completely financed them. These primarily consist of reservoirs and fences. In recent years, the BLM has sought and participated in cost-shared projects with other agencies and private organizations to achieve mutual goals on public and private lands.

The CFO began running vegetation studies in 1980. These studies were set up with cooperation from the New Mexico State Land Office, the New Mexico Grazing Task Force, the BLM, the Grazing Advisory Board, and ranchers. There are currently 574 range studies within the planning area. Completion of vegetation studies measuring trend, condition, and utilization has typically coincided with each allotment's grazing permit renewal. These data have been used to show the amount of livestock an allotment can support (i.e., carrying capacity).

3.3.4 Travel and Transportation Management

Travel and transportation are generally associated with motor vehicle use; however, the BLM must consider all forms of transportation within the CFO during the RMP planning process. Travel management encompasses all forms of transportation, including bicycles and motorcycles, automobiles, trucks, and OHVs. OHVs include all-terrain vehicles (ATVs), off-highway motorcycles, and snowmobiles.

The travel route network within the planning area is composed of county roads, BLM-maintained roads and byways, primitive two-track routes, and OHV trails. The maintenance and use of these travel routes has become an integral part of BLM travel management because these roads are used for both recreational and non-recreational purposes.

3.3.4.1 Vehicle Routes

The planning area is crossed by several primary highways and secondary roadways that connect communities, as well as a series of county roads that provides the general public with access to remote locations. The planning area has no interstate highways. U.S. Highway 62/180 is the principal east-west four-lane highway that serves as the primary route from Hobbs, New Mexico, to El Paso, Texas. It is a very popular route for tourists and other visitors to reach Carlsbad Caverns and Guadalupe Mountains National Parks.

New Mexico Highway 285 runs north and south between Santa Fe, New Mexico, and Fort Stockton, Texas. Other frequently traveled roads in Eddy County include Highways 137, 31, 360, 176, 128, 18, 529, and 396; U.S. Refinery Road; Illinois Camp Road; Hagerman Cutoff 217; and Red Road. Numerous temporary roads are continuously being constructed and reclaimed as the result of ongoing oil and gas operations within the CFO. The county road system is made up of 802 miles of paved roads and 437 miles of unpaved roadway.

The CFO currently maintains 123 miles of roadways within the planning area: State Line (34 miles), Hat Mesa (20 miles), Gnome Road (10 miles), TA Mayes Road (4 miles), and the Guadalupe National Backcountry Byway (55 miles). The larger network of unimproved, two-track, and industrial roads is continuously changing, and most of these roads are not maintained by the BLM. Much of the existing transportation system is associated with industrial use, including mineral extraction and oil and gas development, and most of these industrial roads are managed under ROW grants.

In October and November 2011, a travel inventory was conducted to identify travel routes and trails within the existing and proposed Special Designations in the CFO, and to assess route and trail conditions. The information obtained from the inventory would be used during the RMP planning process to revise the open, limited, and closed OHV travel designations within the planning area.

3.3.4.2 Off-Highway Vehicle Use

The BLM manages approximately 150 miles of OHV trails within the CFO planning area. Under the current Carlsbad RMP, two categories of OHV use were designated: OHV limited and closed. The closed areas do not allow any OHV use, except in conjunction with BLM activities. Limited areas allow OHV use but restrict that use to existing roads or ways. Current OHV use and planning area acreages for the two categories are shown in Table 3-27 below.

The most popular types of OHVs in the planning area are four-wheel-drive sport utility vehicles, dune buggies, ATVs, and motorcycles. In addition, OHV use provides access for hunters and non-motorized recreational activities, such as fishing, boating, hiking, caving, mountain biking, horseback riding, and primitive camping opportunities.

OHVs are also used for a variety of non-recreational and administrative activities, including livestock management, survey work, and land management. Employees of government agencies, ranchers, energy companies, and utility providers are permitted users who may be allowed to use OHVs for the continued operation and maintenance of their facilities. The BLM uses OHVs for range inspections, vegetation treatments, surveys, mapping, inventories, monitoring, fire suppression, project construction, and maintenance.

Table 3-27. Travel Designations in the Planning Area

Designation	Acreage
Closed areas: travel by vehicles is prohibited	55,966 (2.7%)
Limited areas: use is OHV limited in existence as of 1988	2,035,307 (97.3%)
Total	***2,091,273***

Source: BLM 1988.

A Travel Management Plan has not yet been developed within the planning area, and the OHV designations assigned in the current RMP do not adequately address the existing OHV issues and resource concerns within the planning area (see below).

Certain areas in the CFO are more likely to attract OHV use, including areas with readily available public access, existing loop trails, sandy soils or dunes, and large parcels of federal land allowing for long-distance rides coupled with varied terrain. These popular areas include Hackberry Lake, Alkali Lake, Square Lake, and game management units. Areas with high concentrations of OHV use could be heavily impacted by unregulated motorized recreation. Impacts caused by OHV use include increased soil erosion, habitat fragmentation, stream sedimentation, physical damage to vegetation, and damage to vegetative communities due to the spread of invasive plant species. Environments that are more susceptible to OHV damage include fragile karst areas, special status species habitat, wildlife breeding areas, riparian habitats, and areas with steep slopes or sensitive soils.

3.3.4.3 Trends

The combined effect of population growth in the western United States, technological advances in recreational vehicles, and increases in the recreational use of OHVs in the planning area has generated increased social conflicts and resource use impacts on public lands related to motorized recreation.

OHV designations on BLM-administered lands focus on balancing recreational opportunities and administrative access with environmental protection; however, indiscriminate use of OHVs continues to increase, creating unauthorized pioneered trails on limited and closed OHV areas. These trails can scar landscapes, dissect vital wildlife habitats, degrade cultural and paleontological resources, and cause increased erosion to fragile soils.

The limited OHV use designation was originally intended to allow OHV use without increasing the number of surface disturbance acres in the planning area. Recreational users within limited areas cannot use OHVs to travel off roads and trails. The RMP revision (2008) prohibits any off-road use including game retrieval in limited and closed areas (BLM 2008a). Motorized off-road travel to perform administrative tasks, which includes activities such as livestock management and casual use to accommodate energy-related exploration, is currently allowed. However, OHV users can sometimes perceive random single passes created by necessary tasks as existing routes. This trend creates an increase in established roads and trails. In areas where vehicle use is OHV limited, it is difficult to manage user-created routes because subsequent users can legally operate on non-designated routes.

OHV use is expected to increase as the vehicles become more affordable and as motorized recreation appeals to a wider segment of the population, some of whom may not have the physical capability to enjoy traditional recreational activities such as hiking or backpacking. The population in the regional area is projected to continue at approximately a 1% growth rate over the next decade (University of New Mexico Bureau of Business and Economic Research 2012), with an expected increase in both motorized and non-motorized recreation.

3.3.5 Recreation and Visitor Services

Public recreational opportunities in southeastern New Mexico and the CFO planning area lie on lands managed by numerous federal and state agencies: the BLM, the NPS, the USFS, the Bureau of Reclamation, and the New Mexico State Parks Division. The BLM recreation areas within the planning area are described below; however, areas of recreational opportunity within or adjacent to the CFO planning area include two national parks (Carlsbad Caverns and Guadalupe Mountains), the Lincoln National Forest, the Living Desert State Park, and Brantley Lake State Park.

Recreation activities on BLM-administered lands are varied and dispersed, and the physical landscape features that enhance opportunities for recreation and attract visitors to BLM-administered land include open spaces, diverse wildlife and vegetation, riparian areas, scenic vistas, panoramic views, unique geology (including portions of the Permian Reef Complex within the planning area), varied terrain (steep mountains, rolling hills, arroyos, canyons, and grasslands), waterways (lakes, rivers, and streams), and world-class caves and cavern systems. This diversity of landscapes within the planning area provides a wide range of opportunities for sightseeing, caving, wildlife and plant viewing, hiking, backpacking, boating, swimming, picnicking, horseback riding, photography, sport shooting, hunting, fishing, rock climbing, biking, OHV use, geocaching, orienteering, camping, and backcountry solitude. While all of these activities are available for visitor use and enjoyment, the predominant uses within the planning area are hunting, camping, hiking, and recreational OHV use.

Recreation management is one of the primary missions of the USDI, and, as a major land management agency within that department, the BLM uses established policies and guidelines to manage recreational resources. The objectives of the CFO outdoor recreation program are to 1) provide a broad spectrum of resource-dependent recreational opportunities to meet the needs and demands of visitors to the planning area, 2) encourage agency-wide efforts to improve service to the visiting public, 3) maintain high-quality recreation facilities to meet public needs and enhance the image of the agency, and 4) improve public understanding and support of the CFO recreation program by effectively communicating the agency's multiple-use management programs to the recreation visitor.

Recreation planning seeks to create opportunities for visitors to experience certain physical and social outcomes. Recreational values are considered in management planning by using the following concepts: 1) settings provide opportunities for recreational experiences by users of recreation resources, and 2) a diversity of recreational settings provides the basis for quality recreational experiences. By providing a diversity of settings with varying attributes across the planning area, and making visitors aware of those opportunities, the CFO can ensure that visitors would have opportunities for quality recreational experiences (McCool et al. 2007). To create these opportunities, the CFO may designate appropriate areas as Recreation Management Areas (RMAs) for managing recreation and visitor services. The RMA designation is based on addressing recreation demands and issues, maintaining recreation setting characteristics, resolving use/user conflicts, ensuring compatibility with other resource uses, and addressing resource protection needs.

The RMAs may be classified as either a Special Recreation Management Area (SRMA) or as an Extensive Recreation Management Area (ERMA). The SRMA is an area with very specific recreational opportunities that require intensive management. These are designated for their unique value, importance, and/or distinctiveness, especially as compared to other areas used for recreation. An SRMA is managed to protect and enhance a targeted set of recreational activities, experiences, benefits, and desired recreational opportunities. The CFO may subdivide an SRMA into recreation management zones (RMZs) to further delineate specific recreation opportunities. Within an SRMA, recreation and visitor services management is recognized as the predominant planning focus. The SRMAs usually receive more intensive use, so they require more BLM management staff and visitor facilities. The ERMA encompasses all of those areas within the planning area that are not managed as SRMAs. The recreational activities, benefits, and opportunities in ERMAs are not as focused as for SRMAs. While the ERMAs also require CFO management and planning, the level of CFO staff management and visitor facilities is less than those dedicated to SRMAs. Both types of areas are recognized as producing quality recreation opportunities and offering beneficial outcomes for recreation resource users, recreation-tourism partners, visitor service providers, and communities.

A planning area management classification that is not specifically recreation management related but provides recreational opportunities is the designation of ACECs. The ACEC is established within the planning area where special management attention is needed to protect and prevent irreparable damage to important historic values, cultural values, scenic values, fish and wildlife resources, or other natural systems or processes. The protection of these resources provides certain types of recreational opportunities such as sightseeing, wildlife viewing, nature study, and historic and prehistoric cultural site viewing and education.

3.3.5.1 Special Management Areas

The 1988 Carlsbad RMP identified 12 areas with recreation values and opportunities that warrant special management attention. These 12 areas are located within the Dark Canyon, Lonesome Ridge, Pecos River Corridor, and nine Cave Management Units (see Section 3.2.3). Recreational caving occurs in the Dark Canyon SMA, Dry Cave RNA, Chosa Draw ACEC, Fence Canyon Cave Complex, Lonesome Ridge SMA, and McKittrick Hill Cave Complex (see Map 3-31 in Appendix B).

The planning area contains the following developed recreation areas and associated facilities:

- **Cottonwood Day Use Area of the Black River SMA:** Two single picnic shelters, one group picnic shelter, pipe rail fencing, a wildlife viewing deck, trailhead kiosk, six picnic tables, a vault toilet, a semi-paved parking lot, a water fountain, and two trash receptacles.
- **Guadalupe National Backcountry Byway:** Two picnic shelters, cable fencing, two kiosks, landscaping, three picnic tables, and graveled parking areas.
- **The La Cueva Non-Motorized Trail System:** A graveled parking area and trail signage.
- **Hackberry Lake Dunes Complex OHV Area:** Nine single picnic shelters, two group picnic shelters, picnic tables, fire rings or grills, trash receptacles, pipe rail fencing, an informational kiosk, a graveled parking lot, a vault toilet, and site roads.
- **Hackberry Lake Trail System OHV Area:** Two single picnic units, three group picnic units (units include a shelter, tables, a fire ring or grill, and trash receptacles), a kiosk, a vault toilet, a graveled parking lot, and site roads.

Recreation areas that experience high visitation levels and/or public demand for dispersed or developed recreational uses and have the potential to accommodate such demand or provide unique recreational opportunities are described below.

3.3.5.1.1 Black River Management Area and Cottonwood Day Use Area

The Black River Management Area consists of 1,275 acres of BLM-administered land at the headwaters of the Black River in southwestern Eddy County. The area was acquired by the BLM from the Nature Conservancy after the 1988 RMP was approved. The BLM currently manages more than 3 miles of the river and adjacent lands on both sides of the river. The CFO has developed specific management goals for this unique desert resource. Recreation developments facilitate opportunities such as environmental education, wildlife viewing, picnicking, fishing, swimming, and hiking. A fenced parking area, picnic tables, grills, shelters, vault toilet, accessible path, viewing deck, kiosk, and interpretive signs are provided for visitor convenience and enjoyment. Motorized vehicle use in the area is limited to designated routes and trails. A few isolated areas are closed to motorized vehicle use due to environmental concerns.

3.3.5.1.2 Hackberry Lake OHV Area

The Hackberry Lake OHV Area is located approximately 20 miles northeast of Carlsbad. Roughly 55,800 acres are designated for a variety of OHV uses, of which 53,560 acres lie within BLM-administered lands. The BLM-designated area includes a single- and double-track vehicle trail system and a sand dune complex. Visitors can observe the natural desert scenery of rolling sand dunes, deep arroyos, and open desert plains. Various types of native wildlife and vegetation are found in the area. Visitors frequent the Hackberry Lake OHV Area from nearby population centers, including Carlsbad, Artesia, Hobbs, and Roswell. There are few opportunities for dispersed camping. Out-of-state visitors are also common, as the annual Desert Rough Riders ATV/motocross race attracts many regional competitors and spectators (see the Visitor Use section below).

3.3.5.1.3 La Cueva Non-Motorized Trail System

The La Cueva Non-Motorized Trail System is partially located within the city limits of Carlsbad on the southwest side of the city. The trails were generally created by the local mountain biking community and have gained popularity with other users. Various recreational communities currently use the trails for hiking, mountain biking, and horseback riding.

This area was informally developed after the 1988 RMP and has not been designated as an RMA. The BLM acknowledged the use of the area and has collaborated with local user groups to develop and improve the area. Two National Public Lands Day activities have been hosted at the site to address a persistent public dumping problem. The International Mountain Bike Association Traveling Trail Crew visited the site twice and assisted with the design and maintenance of the trails. Grant funding provided trail maintenance by the Rocky Mountain Youth Corp in 2010 and 2011.

Current improvements include a designated parking area, a trailhead, and trail signs. Other partners in the development of the area are the Eddy County Road Department and the City of Carlsbad Chamber of Commerce. The site covers approximately 2,200 acres and contains 33 miles of existing trails. The trails wind through the rolling limestone foothills of the Guadalupe Mountains and the rugged Chihuahuan Desert environment. Abundant wildlife can be seen in the area. Populations that visit the multipurpose trail system most often come from Carlsbad, Roswell, and Albuquerque, New Mexico; and El Paso, Lubbock, and Midland, Texas.

3.3.5.1.4 Pecos River Corridor SRMA

The Pecos River Corridor SRMA contains approximately 6,008 acres. It includes a 0.5-mile corridor of BLM-administered lands along the Pecos River, as well as lands surrounding Red Bluff Reservoir. The area emphasizes water-based recreation along the free-flowing Pecos River. It provides for semi-primitive motorized recreation opportunities. Lands near Red Bluff Reservoir are used for day and overnight use, including camping, picnicking, boating, fishing, horseback riding, and wildlife observation. Management objectives identified in the 1988 RMP provide protection for scarce water-based recreation, public access, and protection of natural values while allowing for semi-primitive motorized recreation and soil and vegetation restoration.

3.3.5.1.5 Cave Resources SRMA

The 8,626-acre Cave Resources SRMA is composed of nine separate cave units scattered throughout the central portion of the CFO (see Map 3-31 in Appendix B). In addition to their recreation resources, the cave units contain unique geologic, biologic, paleontologic, and hydrologic resources. The caves receive intense visitor use and the SRMA is primarily managed for recreational caving opportunities, as well as for educational and scientific uses. The 1988 RMP management objectives for the SRMA stipulate that the cave units are to be protected for their scenic and other natural values while still allowing for recreation, education, and scientific research. Surface-disturbing activities are restricted around the cave units, and OHV use is limited to designated routes.

3.3.5.2 Visitor Services

The Recreation Management Information System is the official record for outdoor recreation information on public lands managed by the BLM and tracks a wide variety of recreation use statistics, including visitor use, program trends, SRPs, and partnerships at the field level. In Fiscal Year 2011, the CFO had approximately 109,696 visitors for a total of approximately 91,616 visitor days.[4] Table S.26 in Appendix S shows areas within the planning area for which visitor use is entered into the Recreation Management Information System.

The CFO issues SRPs to authorize certain recreational uses of public lands and related waterways managed by the BLM. Permits are issued for commercial use, competitive use, vending, special area use, and certain organized group activities or events. Organized groups and special area permits are usually issued in high use areas or where recreation use requires special BLM management. Commercial SRPs are also issued as a mechanism to provide a fair return to the CFO for the commercial recreational use of public lands. The CFO administers approximately three SRPs annually for outfitter/guides and OHV events. COAs are attached to the permits, as appropriate, to assure compatibility of projects with recreation management objectives and the BLM's policy of multiple use. Recreational caving in certain caves is also subject to a permit system, and the CFO issues approximately 80 to 90 SRPs annually for recreational caving. Table 3-28 shows the SRPs issued during the 2009–2010 season.

Table 3-28. Special Recreation Permits, 2009–2010

Permit Holder	Type of Activity	Location
Desert Rough Riders	ATV and motocross racing	Hackberry Lake OHV Area
Runyan Ranch	Horseback rides	Hope
Brugman Outfitter/Guide	Hunting outfitter/guide	Carlsbad area
National Outdoor Leadership School	Cave conservation and ethics training	McKittrick Hill and Parks Ranch

3.3.5.3 Trends

Increased energy development and mining activities are expected to decrease the quality of recreational opportunities within the CFO that are currently popular for dispersed recreation. Key areas include riparian areas of the Pecos, Black, and Delaware Rivers; large, shifting sand dunes within the district (developed and undeveloped); the Guadalupe Escarpment Scenic Area; game management areas; caves; and OHV trails.

A gradual shift to developed or specially designated areas is anticipated for activities and events, including OHV activities, equestrian use, mountain biking, hiking, fishing, swimming, caving, geocaching, recreational shooting, picnicking, photography, and wildlife viewing. The quality of hunting would be closely related to the quality of adapted wildlife habitat, as development occurs. The BLM has received recent requests from the public seeking development of equestrian trails and expansion of OHV areas.

[4] One visitor day is equivalent to 12 hours spent in the planning area.

3.3.6 Land Use Authorizations

The major focus areas for the lands and realty program in the CFO are ROWs associated with numerous oil and gas permitting, communication sites, and other land use authorizations. Wind and other renewable energy development ROWs are also permitted through this program.

The CFO processes approximately 1,100 to 1,200 ROW actions annually. These include ROW applications for new facilities (e.g., roads, power lines, pipelines, compressor sites, saltwater injection facilities, fiber optic lines, telephone lines, communication sites, and water facilities) and for amending, assigning, renewing, or relinquishing existing ROW grants. The CFO administers approximately 11,894 authorized ROWs (Table 3-29) that occupy approximately 111,744 acres of BLM-administered land (BLM 2014b [LR2000 Database System]). All resource uses are considered and environmental impacts analyzed prior to the issuance of grants and permits.

Table 3-29. Number and Acreage of Existing Rights-of-way in the Planning Area

Type	Number of Authorizations	Acres[1]
Roads[2]	1,292	16,071
Pipelines/sites[3]	7,650	59,369
Power lines/sites	2,622	14,579
Telephone/fiber optic cables	110	1,682
Water facilities, ditches, and reservoirs	208	7,802
USFS easements/grants	1	2
Other	11	12,239
Total	***11,894***	***111,744***

Source: BLM 2014b

1 ROW miles were not calculated because there are significant numbers of existing supplemental uses within the grant information. LR2000 totals do not reflect these supplemental uses and therefore, would not be accurate. As a result, the acres were calculated to provide an accurate calculation of actual surface disturbances.

2 Includes railroad and stations; federal highway and material sites under Sec. 317.

3 Mostly oil and gas related.

The CFO currently administers four temporary land use permits involving about 2 acres of BLM-administered lands (BLM 2014b). These permits are issued for a term of up to 3 years and are for the temporary use of public lands.

Six 1-mile-wide ROW corridors totaling 185 miles and covering 118,400 acres are designated in the 1998 RMP. Because ROW activity associated with oil and gas development typically occurs outside designated corridors, additional corridors are needed in the planning area. Corridor activities are usually grouped by compatible activities and are permitted based on the type and need of proposed facilities and lack of conflicts with other resource values and uses.

The West-wide Energy Corridor 89-271 is designated multi-modal for future electrical transmission and pipeline projects. It begins near the southeast corner of New Mexico and extends northwest for approximately 213 miles (including gaps) (West-wide Energy Corridor Information Center 2018), with 69 miles of designated corridor on BLM-administered lands. The corridor has a width of 3,500 feet on BLM-administered lands.

The CFO currently manages 30,965 acres as ROW avoidance areas. WSAs (7,056 acres) are managed as exclusion areas. Development is also restricted in some ACECs.

The CFO currently administers 47 ROWs or leases associated with communication sites and maintains five Communication Site Management Plans. Communication uses within the planning area include television, FM radio, microwave, cellular, personal communication system, two-way radio, global positioning system (GPS), and paging services.

It is the policy of the BLM to keep the public lands open for public use and enjoyment. However, there are conditions that warrant the removal or withdrawal of certain BLM-administered lands from general use. Through withdrawal of these lands, public safety is guaranteed or integrity of special uses is assured. For instance, saleable minerals can be sold only from lands unencumbered by mining claims. In some cases, the minerals under a Mineral Material Sale Area may be withdrawn to protect the sale area. The other typical use of mineral withdrawals in the CFO is to protect values within SMAs. Mineral estate is discussed in Section 3.3.1.

The CFO currently uses eight types of withdrawals identified in Table S.27 in Appendix S. The miscellaneous withdrawals include a variety of purposes but usually protect an ACEC, SMA, or other facility that would otherwise be adversely affected.

Secretarial Orders have been used in the planning area to withdraw BLM-administered lands from general use by transferring management responsibility to other USDI agencies, such as the Bureau of Reclamation. Executive Orders have been used to transfer management responsibility to agencies outside the USDI, such as the U.S. Department of Defense and the USFS. BLM-administered lands have been transferred by Public Law 102-579 to the DOE for the purpose of locating the Waste Isolation Pilot Plant (WIPP), by Public Law 103-169 for the purpose of protecting cave/karst resources under the Lechuguilla Cave Protection Area, and by Public Law 88-249 to establish the boundaries of Carlsbad Caverns National Park. In some cases, both the lands and responsibility for their management are transferred. In other cases, a Memorandum of Understanding is issued to outline the management responsibilities (e.g., mineral lease management, grazing management) between agencies.

In an effort to keep as much BLM-administered land open to the widest variety of uses, the CFO reviews all existing withdrawals on a periodic basis. Such reviews ensure that the reasons for the restrictions are still valid and that the smallest acreage possible is included in withdrawal status. The need for new withdrawals of public land within the planning area should continue to decrease in the future. Most BLM-administered lands containing resources that need to be protected by withdrawals already have such a protection in place.

3.3.7 Land Tenure

3.3.7.1 Current Level and Location of Use

As mandated by FLPMA, BLM-administered lands are retained in federal ownership, with the exception of lands that have potential for disposal as identified in a land use plan. BLM-administered lands have potential for disposal when they are isolated or difficult to manage or meet public objectives such as community expansion or economic development. BLM-administered lands classified as withdrawn, reserved, or otherwise designated are not available for sale or exchange. Most requests from private individuals to acquire BLM-administered lands involve lands surrounded by, or adjacent to, their private lands. These requests generally result as a matter of proximity (e.g., to farm operations, grazing, or residential properties) and the need to either expand operations or make operations more efficient.

The following are descriptions of land tenure adjustments as allowed under FLPMA:

- **Sale:** Sale of BLM-administered lands must meet the disposal criteria set forth in Section 203 of FLPMA. BLM-administered lands determined suitable for sale are offered on the initiative of the BLM and sold at not less than fair market value. These lands suitable for sale must be identified in the land use plan. A plan amendment must occur if the specific parcels to be disposed of by sale are not identified in the current land use plan.
- **Acquisition:** Acquisition of private land, or interest in land, is pursued to facilitate various resource management objectives and is authorized under Section 205 of FLPMA. Acquisitions, including conservation easements, are generally completed through exchanges, purchases (including Land and Water Conservation Fund), donations, or receipts from the Federal Land Transaction Facilitation Act of 2000 (FLTFA) (43 USC 41 § 2301, et seq.).

- **Exchange:** Land exchanges, as authorized under Section 206 of FLPMA, are initiated either in direct response to public demand or by the BLM to improve management of the public lands. Public lands need to be identified as suitable for exchange in a land use plan. Private and state lands are considered on a case-by-case basis for acquisition through exchange of suitable public land, where the exchange is in the public interest, and where the lands acquired have higher resource or public values than the lands that are being exchanged.

BLM-administered lands that meet the retention criteria typically include large blocks of lands, but also may include areas in which there are high public values suitable for BLM management. Lands outside these management areas are generally available for the full range of land ownership adjustment opportunities including retention, exchange, sale, or transfer. Land ownership adjustment proposals in the planning area are analyzed in project-specific reviews. BLM-administered lands are fairly well consolidated in Eddy County, but occur as a mixed-ownership land pattern in the majority of Lea County and the portion of Chaves County managed by the CFO.

Land tenure adjustments are important to state and local governments to consolidate ownership and make lands available for public purposes. Few land tenure adjustment actions are initiated in the planning area because of the amount of BLM-administered lands leased for oil and gas. The existing surface management pattern within the planning area is shown in Map 3-1 in Appendix B. The FLTFA allows for the proceeds from the disposal of BLM-administered lands to be used by the BLM to acquire inholdings and other lands that would improve resource management ability. The proceeds may also be used to complete appraisals and satisfy other legal requirements for the sale or exchange of BLM-administered land identified for disposal. This act applies to BLM-administered lands identified in current land use plans as suitable for disposal as of July 25, 2000. BLM-administered lands currently identified as available for disposal in the existing planning documents total 218,414.72 acres and are shown in Map 3-32 in Appendix B.

Since the adoption of the 1988 RMP, several adjustments to surface ownership have occurred as the result of certain realty actions, mainly exchanges and sales. Thirteen land sales have occurred, totaling 6,016.95 acres (LR2000 Database Report 2014). The purpose of most of the sales was to resolve trespasses or accomplish sales through the FLTFA. The primary means of land ownership adjustment within the planning area has been through land exchanges. Four land exchanges within the planning area were completed since 1988. As a result of those actions, 57,132 acres left federal ownership and 3,515.69 acres came into federal ownership.

For private land acquisition, the 1988 Carlsbad RMP identified 1,080 acres of private land and 2,120 acres of state land in order to protect important resource values and meet objectives for SMAs. State land acquisition proposed in the 1988 RMP included the Laguna Plata Cultural Resource Management Area (1,280 acres) and Pecos River/Canyons Complex ACEC (840 acres). These acquisitions have not yet occurred.

Revenues generated from FLTFA sales are required to be split between the respective state (4%) for educational purposes or for the construction of public roads and a special account (96%) available to the Secretary of the Interior and the Secretary of Agriculture for acquisition of land in certain federally designated areas and for administrative expenses necessary to carry out the sale program. The FLTFA expired in July 2010 but was extended for 1 year by Congress with emergency supplemental appropriations. The FLTFA was not extended when it expired in 2011.

3.4 SPECIAL DESIGNATIONS

3.4.1 Outstanding Natural Areas

The ONA designation was established by Congress primarily to protect unique scenic, scientific, educational, and recreational values. Recreation activities focus on education and interpretation of the ONA's unique resources (BLM 2012c).

3.4.1.1 Lonesome Ridge ONA

This 2,990-acre area is part of the Capitan Reef Complex, considered the world's foremost example of a Permian-age fossil reef. The area displays spectacular rugged scenery with sheer limestone canyon walls over 1,500 feet high. The area contains relict Douglas-fir trees and other species of rare, state sensitive, and federally endangered plants and animals. Bigtooth maples add flares of fall color. The area provides for primitive non-motorized recreational opportunities, including cave exploration, hiking on semi-developed trails, hunting, and outstanding opportunities for wildlife and scenic photography. The primary objective for this ONA is to provide adequate protection of the area's outstanding natural values in an unaltered condition.

The BLM decision in the 1988 RMP is to manage 2,990 acres of the Lonesome Ridge area as an ONA. The ONA is managed to protect the area's scenic, wildlife, plant, geologic, and natural history values. Management includes closing the area to mining claim location and mineral material sales, controlling surface use on oil and gas leases, and closing the area to OHV use. The 1997 RMPA designated OHV use and implemented the plan as closed to OHV use.

3.4.2 Areas of Critical Environmental Concern

An ACEC is defined in FLPMA as an area within the public lands where special management attention is required to protect and prevent irreparable damage to important historical, cultural, and scenic values; fish and wildlife and other natural systems or processes; and life and safety from natural hazards. The BLM prepared regulations for implementing the ACEC provisions of FLPMA. These regulations are found at 43 CFR 1610.7-2(b).

The ACEC designation indicates to the public that the BLM recognizes that an area has significant values and has established special management measures to protect those values. In addition, the ACEC designation also serves as a reminder that significant values or resources exist that must be accommodated for future management actions and land use proposals. The designation may also support a funding priority. Although federal, state, and private lands may be located within the boundaries of an ACEC, only BLM-administered lands are managed under the ACEC prescriptions.

The ACEC designation is an administrative designation that is accomplished through the land use planning process. It is unique to the BLM in that no other agency uses this form of designation. The intent of Congress in mandating the designation of ACECs through FLPMA was to give priority to the designation and protection of areas containing unique and significant resource values. ACECs differ from other special management designations, such as WSAs, in that ACEC designation by itself does not automatically prohibit or restrict uses. The one exception is that a mining plan of operation is required for any proposed mining activity within a designated ACEC.

An area meets the relevance criteria if it contains one or more of the following:

- A **significant historic, cultural, or scenic value** such as rare or sensitive archeological resources and religious or cultural resources important to Native Americans.
- A **fish and wildlife resource** such as habitat for endangered, sensitive, or threatened plant species, or habitat essential for maintaining species diversity.

- A **natural process or system** such as endangered, sensitive, or threatened plant species; rare, endemic, or relic plants; plant communities that are terrestrial, aquatic, or riparian-wetland; or rare geological features.
- **Natural hazards** such as areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs. A hazard caused by human action may meet the relevance criteria if it is determined that the hazard has become part of a natural process.

The value, resource, system, process, or hazard previously described must have substantial significance and values to satisfy the importance criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

- It has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
- It has a quality or circumstance that makes it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
- It has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.
- It has qualities that warrant highlighting to satisfy public or management concerns about safety and public welfare.

3.4.2.1 Existing ACECs

Map 3-33 in Appendix B depicts the existing ACECs. Table 3-30 lists the existing ACECs within the CFO planning area.

Table 3-30. Areas of Critical Environmental Concern

Name	Acres	Reason for Designation
Blue Springs	140	Riparian, federally listed fish species
Chosa Draw	2,200 [1]	Caves, riparian, sensitive soils, recreation, education, scientific studies
Dark Canyon	1,480 [2]	Visual, natural resource values, caves, threatened and endangered plant species
Lonesome Ridge	3,021	Natural values, recreation, wildlife, scenic
Pecos River/Canyons Complex	5,190	Cultural, scenic, research opportunities, wildlife habitat

[1] The 1988 Carlsbad RMP identified 2,200 acres in the Chosa Draw ACEC; however, the subsequent management plan identified 2,260 acres (BLM 1988).
[2] The 1988 Carlsbad RMP identified 1,480 acres in the Dark Canyon ACEC; however, the subsequent management plan identified 1,550 acres (BLM 1988).

3.4.2.1.1 Blue Springs ACEC

This 160-acre ACEC was designated to protect the grasslands immediately adjacent to Blue Springs, which provides habitat for the only known remaining population of Pecos gambusia in New Mexico.

3.4.2.1.2 Chosa Draw ACEC

This ACEC contains 2,200 acres of hydrologically important gypsum karst. It has significant caves, sinking streams, springs, and numerous sinkholes. The area is sensitive to soil erosion and surface-disturbing activities. The cave resources provide recreational opportunities, as well as habitat for cave-adapted animal species and point sources for groundwater recharge. Primary management objectives are to protect the sensitive karst resources and fragile surface from subsurface interactions. Of primary importance is protection of this significant hydrologic area. Other management goals are to enhance cave-based recreation, education, and scientific use opportunities.

3.4.2.1.3 Dark Canyon ACEC

The Dark Canyon ACEC (1,480 acres) contains highly sensitive visual and natural resource values that include deep rugged canyons with sheer limestone cliffs, several significant and fragile caves, and threatened and endangered plant species. The area abuts the Carlsbad Caverns National Park wilderness area. Management objectives for this ACEC are to emphasize protection of high visual and natural resource values and rare plant species while still providing for other multiple resource uses. All lands within the ACEC have been withdrawn from mineral entry and oil and gas leasing subject to prior existing rights.

3.4.2.1.4 Lonesome Ridge ACEC

This 3,021-acre area is part of the Capitan Reef Complex, considered the world's foremost example of a Permian-age fossil reef. The area displays spectacular rugged scenery with sheer limestone canyon walls over 1,500 feet high. The area contains relict Douglas-fir (*Pseudotsuga menziesii*) trees and other species of rare, state sensitive, and federally endangered plants and animals. Bigtooth maples (*Acer grandidentatum*) add flares of fall color. The area provides for primitive non-motorized recreational opportunities, including cave exploration, hiking on semi-developed trails, hunting, and outstanding opportunities for wildlife and scenic photography. The primary objective for this ACEC is to provide adequate protection of the area's outstanding natural values in an unaltered condition.

3.4.2.1.5 Pecos River/Canyons Complex ACEC

The Pecos River/Canyons Complex ACEC encompasses approximately 5,190 acres. Two large distinctive canyons, Pierce and Cedar, converging with one of the remaining free-flowing sections of the Pecos River provide a unique landscape in southeastern New Mexico. The close association of the canyons and river display a combination of values, including unique riparian habitat not elsewhere evident in the desert grassland of southeastern New Mexico; the convergence of many diverse soil types such as deep sands, gypsum soils, gravelly loam, loamy bottomlands, and active sand dunes; distinctive and virtually unspoiled scenic values, particularly in the two canyons; large and culturally complex archaeological sites suggesting occupation over a long period of time (Archaic, Jornada, and Mogollon periods, 7,000 B.C.–A.D. 1350); and prime wildlife habitat for several endangered wildlife species. The canyons could provide vegetative habitats with high potential for supporting state-listed endangered plant species. Management objectives for this ACEC would emphasize protection of the sensitive and unique natural and cultural resources, as well as scenic qualities. It would also provide research opportunities while still allowing other compatible resource uses.

3.4.2.2 Proposed ACECs

3.4.2.2.1 Birds of Prey ACEC

The proposed Birds of Prey ACEC is approximately 349,355 acres of BLM-administered land within the planning area. This area would be managed to protect avian wildlife resources. The Chihuahuan semi-desert grassland within the ACEC contains a highly diverse population of birds of prey (raptors) and other grassland birds. The habitat in the area provides the necessary prey base, water, cover, nesting structure, and unfragmented land area for avian diversity. Cliffs and escarpments in the area provide ideal nesting sites, while the area's grasslands support large populations of small mammals and grassland birds for prey. The co-occurrence of abundant nesting sites, unfragmented habitat, and food supplies is the chief factor in the area functioning as year-round avian habitat. In addition, a substantial number of birds migrate through the ACEC each spring and fall season. The proposed ACEC is located between two principal routes of the Central Flyway, which is one of four waterfowl flyways in North America.

3.4.2.2.2 Boot Hill ACEC

The proposed Boot Hill ACEC is approximately 1,065 acres of BLM-administered land within the CFO and encompasses a portion of the Poco Site SMA. This area would be managed to protect cultural and paleontological resources. The Boot Hill ACEC contains a number of significant sites eligible for listing on

the NRHP. Significant faunal remains such as pronghorn and bison have been documented, providing a window into the past for understanding the subsistence (dietary) strategies of the prehistoric occupants. In addition, several of the sites within the ACEC are associated with surface semi-circular rock-lined structures located on the periphery of the site. The function of these structures is not yet understood. The ceramic assemblage has intrusive wares, which is indicative that the past occupants were in contact with other groups outside of southeastern New Mexico.

In addition, fossil remains frequently occur in this area, as evidenced by the presence of a mammoth tusk found eroding from an arroyo wall and observations of other paleontological remains in the area.

3.4.2.2.3 Carlsbad Chihuahuan Desert Rivers ACEC

The proposed Carlsbad Chihuahuan Desert Rivers ACEC is approximately 108,484 acres of BLM surface ownership within the planning area, and encompasses portions of the Chosa Draw ACEC, Yeso Hills RNA, Cave Resources SMA, Guadalupe Escarpment Scenic Area, Pecos River Corridor SMA, and Springs Riparian Habitat Management Area from the 1988 RMP. This area would be managed to protect historic, cultural, scenic, fish and wildlife, karst, paleontological, riparian, soils, and special status plant resources.

Historic activities in the area include Captain John Pope's 1854 expedition to find a route for the Transcontinental Railroad. The area along the Delaware River was one of the earliest regions of settlement in Eddy County. A recent cultural resources survey of the Delaware River recorded 13 historic sites comprising a historic homesteading district along the Delaware River. These sites are being formally nominated for listing on the NRHP as a historic district.

This area contains prehistoric archaeological sites and areas of traditional cultural importance to Native American tribes. Archaeological sites have been recorded along the portion of the Delaware River on BLM-administered lands. In addition, paleontological resources such as Pleistocene mammoth and bison bones have been recovered along the eroding banks of the Delaware River.

Portions of the Pecos, Black, and Delaware Rivers provide unique scenic values that are enhanced by topographic and riparian diversity not commonly found in the planning area. Riparian landscapes display dramatic transitions from stark, white gypsum soils and sparsely vegetated sandy flats to rolling hills and deep drainages. The Guadalupe Escarpment provides a dramatic background with sheer, rugged peaks that extend 2,000 feet above the desert floor. Unique soils, geology, and hydrogeological processes give the Black River an aqua blue color that is not seen elsewhere in southeastern New Mexico.

Riparian areas in New Mexico, especially those in the Chihuahuan Desert, are some of the most biologically rich areas in temperate regions. Most of the organisms on the New Mexico list of threatened and endangered species are either riparian-dependent or are high users of riparian areas. Riparian areas in the proposed ACEC include the Delaware, Pecos, and Black Rivers.

There are several fish and wildlife species within the proposed ACEC that are threatened, endangered, or considered to be species of concern by either the BLM or the State of New Mexico. Some of these include allthorn (*Koeberlinia spinosa*), Texas hornshell (*Popenaias popeii*), bigscale logperch (*Percina macrolepida*), gray redhorse (*Moxostoma congestum*), blue sucker (*Cycleptus elongatus*), Mexican tetra (*Astyanax mexicanus*), roundnose minnow (*Dionda episcopa*), headwater chub (*Ictalurus lupus*), Pecos pupfish (*Cyprinodon pecosensis*), barking treefrog (*Hyla gratiosa*), western river cooter (*Pseudemys concinna*), plainbelly watersnake (*Nerodia erythrogaster*), bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*), peregrine falcon (*Falco peregrinus*), yellow-billed cuckoo (*Coccyzus americanus*), and Bell's vireo (*Vireo bellii*).

The area contains gypsum wild-buckwheat, a federally threatened species. The area also contains three species of concern: gypsum milkvetch (*Astragalus gypsodes*), gypsogenus ringstem (*Anulocaulis leiosolenus* var. *gypsogenus*), and Yeso Hills linum (*Linum allredii*). All of these species are found on gypsum soils and are sensitive to loss or alteration of the habitat.

This proposed ACEC contains hydrologically important gypsum karst. It has significant caves, sinking streams, springs, and numerous sinkholes. The area is sensitive to soil erosion and surface-disturbing activities. The cave resources provide recreational opportunities, as well as habitat for cave-adapted animal species and point sources for groundwater recharge.

The proposed ACEC is an excellent representative of the uniquely exposed Castile Formation within the Chihuahuan Desert ecosystem. Most of the area consists of bare steep slopes and deep eroded arroyos covered by microbiotic soil crusts, a rare and very fragile soil cover. While found across the proposed ACEC, this soil type is best demonstrated in the western portion of the area, the old Yeso Hills Research RNA.

3.4.2.2.4 Cave Resources ACEC

The proposed Cave Resources ACEC is approximately 19,625 acres of BLM-administered land broken into nine individual cave areas, or "units." The Cave Resources ACEC encompasses portions of the Chosa Draw ACEC, Dark Canyon ACEC, Dark Canyon SMA, Guadalupe Escarpment SMA, Cave Resources SMA, and Dry Cave RNA from the 1988 RMP.

These nine cave units each contain some of the most significant cave resources within the CFO planning area and are the most susceptible to resource impacts. The caves within the units range from over 12 miles of surveyed passageways in length to a few hundred feet. A variety of very significant resources, many with national significance, can be found within these caves. Some of these resources include large Pleistocene-aged paleontological deposits, cave-adapted invertebrate species, and very unique geology and mineralogy. The ACEC contains the following units and resources they are managed to protect:

- Boyds' Cave (historic and cultural resources);
- Burton's Flat Cave Complex (fish, wildlife, and gypsum karst resources);
- Chosa Draw Caves (gypsum karst resources);
- Fence Canyon Caves (fish, wildlife, and karst resources);
- Lost Cave (historic resources);
- Manhole/Mudgett's Caves (historic and karst resources);
- McKittrick Hill Caves (historic, fish, wildlife, and karst resources);
- Sinkhole Flats (fish and wildlife resources); and
- Yellowjacket Cave (fish, wildlife, and karst resources).

3.4.2.2.5 Desert Heronries ACEC

The proposed Desert Heronries ACEC is approximately 48,708 acres of BLM surface ownership within the planning area, and encompasses portions of the Pope's Well Cultural SMA, Maroon Cliffs Cultural Resources Management Area, and Phantom Banks Heronies SMA from the 1988 RMP.

The proposed ACEC is managed to protect wildlife resources, particularly herons. Great blue heron (*Ardea Herodias*) nest colonies (heronries) have been documented in western soapberry (*Sapindus saponaria*) tree stands east of the Pecos River within the planning area since the 1970s. With a limited amount of suitable nesting trees along the Pecos River, these herons are forced to nest several miles away from the river, which is their typical foraging habitat.

The stands of western soapberry and other deciduous tree species, associated with ephemeral draws and playas, are essential for the nesting herons, as well as for the survival of a host of other avian species in the area, such as neotropical migrants and other heron species. These tree stands also provide a limited amount of foraging habitat for the herons, as small mammals, reptiles, and amphibians inhabit the area around the tree stands due to the shade and higher humidity.

3.4.2.2.6 Gypsum Soils ACEC

The proposed Gypsum Soils ACEC is approximately 65,564 acres of BLM surface ownership within the planning area, and encompasses portions of the Chosa Draw ACEC, Yeso Hills RNA, Cave Resources SMA, Guadalupe Escarpment Scenic Area, Pecos River Corridor SMA, and Springs Riparian Habitat Management Area from the 1988 RMP.

This area would be managed to protect historic, cultural, scenic, fish and wildlife, karst, paleontological, riparian, soils, and special status plant resources. Historic activities in the area include Captain John Pope's 1854 expedition to find a route for the Transcontinental Railroad. The area along the Delaware River was one of the earliest regions of settlement in Eddy County. A recent cultural resources survey of the Delaware River recorded 13 historic sites comprising a historic homesteading district along the Delaware River. These sites are being formally nominated for listing on the NRHP as a historic district.

This area contains prehistoric archaeological sites and areas of traditional cultural importance to Native American tribes. Archaeological sites have been recorded along the portion of the Delaware River on BLM-administered lands. In addition, paleontological resources, such as Pleistocene mammoth and bison bones, have been recovered along the eroding banks of the Delaware River.

Portions of the Pecos, Black, and Delaware Rivers provide unique scenic values that are enhanced by topographic and riparian diversity not commonly found in the planning area. Riparian landscapes display dramatic transitions from stark, white gypsum soils and sparsely vegetated sandy flats to rolling hills and deep drainages. The Guadalupe Escarpment provides a dramatic background with sheer, rugged peaks that extend 2,000 feet above the desert floor. Unique soils, geology and hydrogeological processes give the Black River an aqua blue color that is not seen elsewhere in southeastern New Mexico.

Riparian areas in New Mexico, especially those in the Chihuahuan Desert, are some of the most biologically rich areas in temperate regions. Most of the organisms on the New Mexico list of threatened and endangered species are either riparian-dependent or are high users of riparian areas. Riparian areas in the proposed ACEC include the Delaware, Pecos, and Black Rivers.

There are several fish and wildlife species within the proposed ACEC that are threatened, endangered, or considered to be species of concern by either the BLM or State of New Mexico. Some of these include allthorn, Texas hornshell, bigscale logperch, gray redhorse, blue sucker, Mexican tetra, roundnose minnow, headwater chub, Pecos pupfish, barking treefrog, western river cooter, plainbelly watersnake, bald eagle, ferruginous hawk, peregrine falcon, yellow-billed cuckoo, and Bell's vireo.

The area contains gypsum wild-buckwheat, a federally threatened species. The area also contains three species of concern: gypsum milkvetch, gypsogenus ringstem, and Yeso Hills linum. All of these species are found on gypsum soils and are sensitive to loss or alteration of the habitat.

This proposed ACEC contains hydrologically important gypsum karst. It has significant caves, sinking streams, springs, and numerous sinkholes. The area is sensitive to soil erosion and surface-disturbing activities. The cave resources provide recreational opportunities, as well as habitat for cave-adapted animal species and point sources for groundwater recharge.

The proposed ACEC is an excellent representative of the uniquely exposed Castile Formation within the Chihuahuan Desert ecosystem. Most of the area consists of bare steep slopes and deep eroded arroyos covered by microbiotic soil crusts, a rare and very fragile soil cover. While found across the proposed ACEC, this soil type is best demonstrated in the western portion of the area, the old Yeso Hills RNA.

3.4.2.2.7 Laguna Plata ACEC

The proposed Laguna Plata ACEC is approximately 4,496 acres of BLM surface ownership within the CFO and encompasses portions of the Laguna Plata SMA from the 1988 RMP.

The proposed ACEC is managed to protect cultural and wildlife resources. The ACEC contains a complex of many sites with surface and subsurface cultural materials that demonstrates the area was used repeatedly over time. The area is still essentially undisturbed despite some salt mining on the playa bottom and Mississippi Chemical Corporation's use of Laguna Plata for emergency brine water disposal. Historically, playas attracted Native Americans during wet periods, as evidenced by the large number of sites surrounding the salt playas. Shells from freshwater clams, brought from the nearby Pecos River, have been found on the edges of the playas. Salt playas were also prime hunting sites due to the freshwater springs found along the edges. Fish from the springs may also have served as a food source. The Laguna Plata Archaeological District is listed on the NRHP.

The nominated ACEC contains known nesting habitat for the western snowy plover (*Charadrius alexandrinus nivosus*). The western snowy plover is a small, sparrow-sized shorebird in the family Charadriidae. The species breeds on the Pacific Coast from southern Washington to southern Baja California, Mexico, and the interior areas of Oregon, California, Nevada, New Mexico, and several other western states. The western snowy plover is regarded as a species of greatest conservation need for the state of New Mexico. In the U.S. Shorebird Conservation Plan (Brown et al 2001), it receives a maximum vulnerability score due to its small population size. In New Mexico, snowy plovers breed on barren or sparsely vegetated ground, usually on alkali lake flats. The alkali lake flats found within the planning area provide wintering habitat for the species.

3.4.2.2.8 Lonesome Ridge ACEC

The proposed Lonesome Ridge ACEC is approximately 3,021 acres of BLM surface ownership within the planning area and encompasses portions of the Lonesome Ridge ACEC, Lonesome Ridge SMA, Guadalupe Escarpment SMA, and Lonesome Ridge Outstanding Natural Area (ONA) from the 1988 RMP. The existing Lonesome Ridge ACEC is 2,981 acres and the additional 40 acres is proposed.

This proposed ACEC is managed to protect scenic, wildlife, geologic, and karst resources. The area is located along the southern end of the Guadalupe Escarpment in New Mexico, adjoining national forest and national park lands in New Mexico and Texas. The limestone escarpment is part of the Capitan Reef Complex, considered the world's foremost example of a Permian-age fossil reef. Lonesome Ridge provides some of the most rugged terrain in the Guadalupe Escarpment. The area features spectacular scenery with sheer limestone canyon walls over 1,500 feet high. A transition from diverse native desert vegetation to mature trees is observable with changes in elevation. The ability to observe fossils, rock composition, geological structures, vegetation, and topography draws visitors and researchers from all over the world. Breathtaking views, unique geological features, diverse flora and fauna, proximity to other federally protected lands, and unobstructed views of nature further enhance the visual quality of the area.

The proposed ACEC is an ecological transition zone from limestone mountains and piñon-juniper habitat on the Lincoln National Forest to the lower elevation shrub-grass habitat on BLM-administered land. This unique dissected landscape and escarpment provides habitat heterogeneity in the nominated ACEC, which, in turn, increases the biodiversity in the area. The cliff faces and caves on the escarpment provide shelter and optimal nesting habitat for many avian species, such as peregrine falcon and cave swallow (*Petrochelidon fulva*). The largest nesting population of cave swallows in New Mexico is located nearby in the Carlsbad Caverns. The peregrine falcon is a USFWS species of concern and is a threatened species for the State of New Mexico. The dense vegetation in the canyon bottoms and along arroyos provides nesting habitat for many species, including Bell's vireo, a USFWS species of concern and threatened species for the State of New Mexico (Biota Information System of New Mexico 2013). Bell's vireo occurs in dense shrubland and woodland along lowland stream courses or riparian areas. Approximately 90% of New Mexico's Bell's vireo nests are located nearby in Carlsbad Caverns National Park and Rattlesnake Springs (Biota Information System of New Mexico 2013).

There are six known significant caves within the proposed ACEC. The remote nature of cave resources within the nominated ACEC has led to pristine conditions that offer research opportunities not often found elsewhere. Swallow Hole Cave, the largest known cave entirely within the ACEC, is home to a large population of cave swallows, and is the only known nesting site within the planning area. It is also the only known cave in the planning area formed within the Capitan Reef limestone.

3.4.2.2.9 Maroon Cliffs ACEC

The proposed Maroon Cliffs ACEC is approximately 8,659 acres of BLM surface ownership within the planning area and encompasses all of the Maroon Cliffs SMA from the 1988 RMP.

This proposed Maroon Cliffs ACEC is managed to protect cultural resources. A wide range of prehistoric site types and activities is represented within the Maroon Cliffs area. The area is topographically diverse, providing a variety of exploitable environments for prehistoric peoples. Recorded archaeological sites include open campsites dating from the Archaic period (5000 B.C.) to the Jornada Mogollon period (A.D. 900–1450).

The area provides opportunities for research of environmental conditions, water sources, diet, and social networking that can contribute significantly to the understanding of prehistoric peoples' lifeways within southeast New Mexico. The proposed ACEC is eligible for listing on the NRHP as an archaeological district.

3.4.2.2.10 Pecos Bluntnose Shiner ACEC

The proposed Pecos Bluntnose Shiner ACEC is approximately 201 acres of BLM surface ownership within the planning area and encompasses portions of the Pecos Bluntnose Shiner Habitat Management Area from the 1988 RMP.

This proposed ACEC is managed to protect fish resources. The Pecos River within the proposed ACEC contains populations of the federally threatened Pecos bluntnose shiner (*Notropis simus pecosensis*). The designated critical habitat for this species is divided into two separate reaches, designated as upper and lower critical habitat. The lower critical habitat reach occurs within the planning area and is a 37-mile segment of the Pecos River extending from Hagerman to Artesia. This area was designated as critical habitat by the USFWS because the river has a flow consisting of clean, permanent water; a main river channel with sandy substrate; and low water.

3.4.2.2.11 Pecos River Canyon Complex ACEC

The proposed Pecos River Canyon Complex ACEC is approximately 4,115 acres of BLM surface ownership within the planning area and encompasses portions of the Pecos River Canyons Complex ACEC and Pecos River Canyons Complex RNA from the 1988 RMP.

This proposed ACEC is managed to protect scenic and plant resources. The proposed ACEC contains Pierce and Cedar Canyons, 30- to 40-foot limestone and sandstone canyons that serve as intermittent tributaries to the Pecos River. These canyons provide dramatic transitions in color and form as the tan, loamy upland soils give way to the reddish, sandy soils of the canyon walls and bottom. The canyon walls and other fragile erosional features provide dramatic contrast to the flat plateaus of the uplands. The canyons vary in width from 200 feet to more than 1,000 feet. At the widest points, one can view the rows of plateaus that make up the canyon walls on the opposite side. Green shrubs dot the landscape of both the uplands and canyons.

The canyons provide vegetative habitats for Tharp's bluestar (*Amsonia tharpii*), a USFWS species of concern, BLM special status species, and State of New Mexico endangered species. Tharp's bluestar is a perennial suffrutescent herb with stems from a woody rootstock and pale blue or greenish white flowers.

3.4.2.2.12 Pope's Well ACEC

The proposed Pope's Well ACEC is approximately 81 acres of BLM surface ownership within the planning area and encompasses portions of the Pope's Well Cultural SMA from the 1988 RMP.

This proposed ACEC is managed to protect historic resources. Pope's Well is a unique and rare historic-era cultural site that represents early American exploration in southeastern New Mexico. This proposed ACEC contains artesian well drill sites and stone remains of the army camp used by Captain John Pope in the mid-1850s. The camp and wells were constructed while trying to establish reliable water sources for the proposed southern route of the transcontinental railroad. This site is eligible for listing on the NRHP.

3.4.2.2.13 Salt Playas ACEC

The proposed Salt Playas ACEC is approximately 49,772 acres of BLM surface ownership within the planning area and encompasses portions of the Laguna Plata SMA from the 1988 RMP. This proposed ACEC is managed to protect cultural and wildlife resources. Historically, playas attracted Native Americans during wet periods, as evidenced by the large number of sites surrounding the salt playas. Shells from freshwater clams, brought from the nearby Pecos River, have been found on the edges of the playas. Salt playas were also prime hunting sites due to the freshwater springs found along the edges. Fish from the springs may also have served as a food source.

Salt playas are important to local plant and animal communities. They serve as essential stops for migratory shorebirds and as water recharge areas that accumulate rain and snow. Most of the salt playas contain water year-round and many have a spring system associated with them. They provide specialized habitat for invertebrates, vertebrates, and birds.

The nominated ACEC contains known nesting habitat for western snowy plover. The western snowy plover is a small, sparrow-sized shorebird in the family Charadriidae. The species breeds on the Pacific Coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, New Mexico, and several other western states. The western snowy plover is regarded as a species of greatest conservation need for the state of New Mexico. In the U.S. Shorebird Conservation Plan (Brown et al. 2001), it receives a maximum vulnerability score due to its small population size. In New Mexico, snowy plovers breed on barren or sparsely vegetated ground, usually on alkali lake flats. The alkali lake flats found within the planning area provide wintering habitat for the species.

3.4.2.2.14 Serpentine Bends ACEC

The proposed Serpentine Bends ACEC is approximately 5,019 acres of BLM surface ownership within the planning area and encompasses portions of the Dark Canyon SMA (Dark Canyon ACEC and Dark Canyon Scenic Area) and the Cave Resources SMA from the 1988 RMP. This proposed ACEC is managed to protect historic, scenic, wildlife, and plant resources. The area contains historic-era sites associated with early guano mining. These sites are considered eligible for listing on the NRHP.

This area contains highly sensitive visual resource values, including deep, rugged canyons with sheer limestone cliffs. The geological composition of steep, winding canyons and mountain draws provides striking contrasts in topography. Cave openings and rock shelters dot the benched canyon walls. This area borders the scenic backcountry of Carlsbad Caverns National Park.

The proposed ACEC is habitat associated with gray-banded kingsnake (*Lampropeltis alterna*) and two subspecies of rock rattlesnakes: the banded rock rattlesnake (*Crotalus lepidus klauberi*) and mottled rock rattlesnake. The gray-banded kingsnake is listed as endangered and a species of greatest conservation need in New Mexico. The banded rock rattlesnake is listed as rare or uncommon by the State of New Mexico, as well as a species of greatest conservation need. The mottled rock rattlesnake is currently recognized as sensitive by USFWS and threatened by the State of New Mexico, as well as a species of greatest conservation need.

The sheer rock faces and ledges of the proposed ACEC serve as potential nesting spots for large raptors, including owls, hawks, and eagles. Eagle nest sites typically occur on cliff faces, rock ledges, or large trees, and include at least one perch with a clear view of the open terrain where the eagles usually forage.

Nine special status plants are documented in the area. The pincushion cactus (*Mammillaria* sp.) is a federally threatened and state endangered species. The button cactus (*Epithelantha* sp.) and White Mountain beard tongue (*Penstemon scariosus*) are state endangered species. The other six—mammillaria cactus, hedgehog cactus, pincushion cactus, Nama, rock daisy, and *Salvia summa* sage—are state sensitive species.

3.4.2.2.15 Seven Rivers Hill ACEC

The proposed Seven Rivers Hill ACEC is approximately 1,027 acres of BLM surface ownership within the planning area, and encompasses all of the Seven Rivers Hill SMA from the 1988 RMP. This proposed ACEC is managed to protect scenic, wildlife, karst, special status plants, and soil resources. This area exhibits extraordinary scenic values with drastic changes in topography and gypsum rills. The contrast of the soil colors in the area is visible to travelers driving between Artesia and Carlsbad.

Five caves contain known bat roosts. Surveys at one cave have shown an established population of over 30,000 cave myotis (*Myotis velifer*). This is the largest known roost of this species in the planning area. Seven Rivers Hill is known to have the densest collection of large, dramatic sinkholes in the planning area. The size and depth of these sinkholes indicate the collapse of large cave passages. The caves in the area play a critical role in the recharging of local groundwater.

This area of bare gypsum hills was the only known habitat for gypsum wild-buckwheat for 90 years. This area is federally designated as critical habitat and is one of only three known populations of this species. This area also provides habitat for other unique and endemic vegetation existing on gypsum soils.

Gypsum soils have a very limited organic component. With such very limited fertility, plant growth is very sparse. Most of the area consists of bare steep slopes and deep eroded arroyos covered by cryptogamic soils, a rare and very fragile soil cover. Cryptogamic soils are a highly specialized community of mosses, lichen, and cyanobacteria. In addition to covering the surface of the soil. Cryptogamic soils also break down rock material, absorb water, slow soil erosion, and provide an environment in which other plants germinate.

3.4.2.2.16 Six Shooter Canyon ACEC

The proposed Six Shooter Canyon ACEC is approximately 735 acres of BLM surface ownership within the planning area. This ACEC does not encompass any special designated areas from the 1988 RMP. This proposed ACEC is managed to protect scenic, wildlife, geologic, and plant resources. This area draws attention because of spectacular rugged scenery with narrow, steep-walled limestone arroyos. Pink sandstone substrate dominates the topographic landscape.

The boundary of the Six Shooter Canyon Proposed ACEC encompasses three Permian-age geologic formations: the San Andres Formation, the Queen Formation, and the Grayburg Formation. They are all members of the Guadalupian Series. The San Andres is mainly dolomite with minor limestone near its base and some chert, sandstone, and reddish mudstone. The basal Grayburg and Queen consist of dolomites and sandstone to the south, grading into gypsum, mudstone, and dolomite to the north. The Queen Formation is distinguished from the underlying Grayburg by its much greater abundance of clastics and red mudstones. All three members of the Guadalupian Series present in the proposed ACEC are cliff-forming units.

This area is an excellent example of a xeric-riparian vegetative community with plants such as Mexican orange (*Choisya dumosa*), Apache plume (*Fallugia paradoxa*), littleleaf sumac (*Rhus microphylla* Engelm. Ex A. Gray), and bricklebrush (*Brickellia grandiflora*). Many large, vigorous patches of Guadalupe mescal bean (*Dermatophyllum guadalupense*), a New Mexico State species of concern and BLM sensitive species, occur in this canyon and in the canyon to the north. The Six Shooter Canyon area populations of Guadalupe mescal bean were determined to be the most concentrated on public land in the Brokeoff Mountains study area. The limestone canyons at the site also support populations of two other rare plants, five-flower rock daisy (*Perityle quinqueflora*) and Guadalupe needlegrass (*Stipa curvifolia*).

3.4.3 Research Natural Areas

RNAs may be set aside to preserve and protect typical or unusual ecological communities, associations, phenomena, characteristics, or natural features or processes. Activities within these areas may only be allowed if they do not interfere with natural processes. Areas designated as RNAs may consist of diverse vegetative communities, wildlife habitat, unique geological formations, or cultural resources, and may have other values identified by physiographic province as outlined in state or agency natural heritage planning documents. RNAs from the 1988 CFO RMP are listed in Table 3-31 and depicted on Map 3-34 in Appendix B. To be designated as an RNA, an area must have one or more of the following characteristics:

- A typical representation of a common plant or animal association
- An unusual plant or animal association
- A threatened or endangered plant or animal species
- A typical representation of common geological, soil, or water features
- An outstanding or unusual geologic, soil, or water feature

Table 3-31. Research Natural Areas Designated by the 1988 Resource Management Plan

Name	Acres	Reason for Designation
Dry Cave	420	Paleontological research
Little McKittrick Draw	10	Hydrological, federally proposed snail
Pecos River/Canyons Complex	2,320	Cultural, scenic, research opportunities, wildlife habitat
South Texas Hill Canyon	1,360	Protected plant species, habitat
Yeso Hills	560	Fragile soils, federally listed species

3.4.3.1 Existing Research Natural Areas

3.4.3.1.1 Dry Cave RNA

This 420-acre RNA is within the McKittrick Hill Cave area that that is part of the Cave Resources SMA. McKittrick Hill Cave is one of 19 known caves within nine cave management units that would be protected and intensively managed. This RNA was designated for paleontological research.

3.4.3.1.2 Little McKittrick Draw RNA

This 10-acre RNA is known habitat for the New Mexico Ramshorn snail (*Pecosorbis kansasensis*). This species is listed by the State of New Mexico as a species of greatest conservation need. The limestone canyon drainage provides ephemeral pool habitat for the snail. The main objective of this RNA is to enhance habitat for this species. This area would provide a focus of studies and data gathering pertaining to Chihuahuan Desert ecosystem functions for use in future management guidance.

3.4.3.1.3 Pecos River/Canyons Complex RNA

The Pecos River/Canyons Complex RNA encompasses approximately 2,320 acres. Two large distinctive canyons, Pierce and Cedar, converging with one of the remaining free-flowing sections of the Pecos River provide a unique landscape in southeastern New Mexico. The RNA would be managed for the primary purpose of conducting research and studies of natural ecological functions along and adjacent to the Pecos River.

3.4.3.1.4 South Texas Hill Canyon RNA

This 1,360-acre RNA is an excellent representative of deciduous woodland and grasslands within the Chihuahuan Desert ecosystem. It is composed of diverse wooded canyon habitat to desert grass uplands and has at least two state-listed plant species, according to the 1988 RMP, great sage (*Salvia summa*) and button cactus (*Epithelantha micromeris*), inhabiting limestone canyon walls. The main objective of this RNA is to protect and enhance this representative habitat as well as known and potential listed species in the area. This area would also provide a focus of studies and data gathering pertaining to Chihuahuan Desert ecosystem functions for use in future management guidance.

Under current listings from the State of New Mexico, great sage is listed as a species of concern and button cactus is no longer listed as rare or a species of concern.

3.4.3.1.5 Yeso Hills RNA

This 560-acre RNA is an excellent representative of the uniquely exposed Castile Formation within the Chihuahuan Desert ecosystem. The fragile gypsum soils are highly susceptible to wind and water erosion but also support a variety of unique, endemic gypsophiles including the federally listed candidate gypsum milkvetch (*Astragalus gypsodes*). The main objective of this RNA is to protect and enhance representative habitat as well as known and potential listed threatened and endangered species in the area. This area would provide a focus of studies and data gathering pertaining to Chihuahuan Desert ecosystem functions for use in future management guidance.

3.4.4 Special Management Areas

SMAs are locations with specialized management concerns or needs that do not necessarily warrant ACEC designation. Generally, SMAs contain resources or opportunities that require a level of management narrowly focused on a localized resource or resource use concern.

SMAs are considered land use authorization avoidance areas because they contain resource values that pose special constraints for, and can result in denial of, applications for land uses that cannot be designed to be compatible with management objectives and prescriptions.

A variety of supporting management activities may be used to implement the management prescriptions. These generally include posting boundaries, installing information signs, conducting inventory and monitoring of resources and their uses, acquiring access where appropriate, acquiring additional lands from willing parties as necessary to meet management objectives, and resolving unauthorized uses.

3.4.4.1 Existing SMAs

Table 3-32 lists the designated SMAs in the planning area, and Map 3-35 in Appendix B depicts their location within the planning area.

Table 3-32. Designated Special Management Areas

Name	Acres	Reason for Designation
Alkali Lake OHV Area	900	OHV area
Bear Grass Draw	1,780	Cultural
Bluntnose Shiner Habitat	200	Riparian, federally listed fish species
Cave Resources	8,450	8 caves, nonrenewable geologic, biological, paleontological, hydrologic, recreational, educational studies
Dark Canyon SMA (includes Dark Canyon Scenic Area)[1]	3,950	Visual
Guadalupe Escarpment Scenic Area	49,570	Visual
Hackberry Lake OHV Use Area	55,800	OHV
Laguna Plata	3,360	Cultural
Maroon Cliffs	11,783	Cultural
Pecos River Corridor	6,000	Riparian, recreation, sensitive Soils
Phantom Banks Heronries	unknown[2]	Colonial bird habitat
Poco Site	51	Cultural
Pope's Well	40	Historical site
Potash Bull Wheel (no longer exists)	4	Historical, site no longer exists
Seven Rivers Hills	540	Sensitive soils, sensitive plant species
Springs Riparian Habitat	524	Habitat, endangered species, riparian, hydrological
Black River	1,296	WSR eligible and suitable
Delaware River	2,804	WSR eligible and suitable

[1] The 1988 Carlsbad RMP identified 3,220 acres in the Dark Canyon Scenic Area; however, the subsequent management plan identified 3,550 acres.
[2] The 1988 RMP notes that there were seven known heronries but does not have an acreage for this area.

Designation and management prescriptions apply only to BLM-administered lands and minerals activities on federally reserved mineral estate. Private lands within or adjacent to SMA boundaries are not affected by these designations or management prescriptions. Existing permittees and other authorized land uses are recognized as valid and rights are grandfathered to the extent applicable under the land use authorization.

3.4.4.1.1 Alkali Lake OHV Area

This area contains 900 acres of rolling and stabilized dune lands that receive heavy motorcycle use. The area is of interest to the local motorcycle club for use during events. The management goal for this area is to allow extensive motorcycle use while working closely with oil and gas interests to meet multiple-use objectives.

3.4.4.1.2 Bear Grass Draw

This 1,780-acre area includes several archaeological sites that may contain intact stratigraphic deposits. One site in particular is very large with various types of archaeological features that contain considerable subsurface cultural material. The SHPO has determined this site eligible for the NRHP. The management objective for this SMA is to protect and preserve the important and sensitive cultural resource values for research.

3.4.4.1.3 Bluntnose Shiner Habitat

This area consists of 200 acres of riparian habitat along the Pecos River. Although oil and gas development is present within the area, health of the riparian habitat is important to the protection of the federally threatened species Pecos bluntnose shiner. A saltcedar zone and grassland floodplain fall within the designated critical habitat for the shiner. The primary objective is to protect and enhance this critical habitat.

3.4.4.1.4 Cave Resources

The Cave Resources SMA includes eight cave areas encompassing 8,450 surface acres of BLM-administered land. These areas receive intensive recreational use and contain unique and nonrenewable geologic, biologic, paleontologic, and hydrologic resources. The caves are used for recreational, educational, and scientific purposes. Management objectives are to protect the scenic and other natural values of all cave resources while still allowing for recreation, education, and scientific uses. Dry Cave (420 acres is a Research Natural Area (RNA) specifically for paleontological research.

3.4.4.1.5 Dark Canyon SMA

The Dark Canyon SMA contains 3,950 acres divided into two management areas, the Dark Canyon ACEC (1,480 acres) and the Dark Canyon Scenic Area (3,220 acres) includes the remaining acreage plus the VRM Class II lands within the ACEC. The SMA also contains 800 acres of split mineral estate with privately owned surface area. This area contains highly sensitive visual and natural resource values that include deep rugged canyons with sheer limestone cliffs.

3.4.4.1.6 Guadalupe Escarpment Scenic Area

This 49,570-acre area of contiguous public land generally parallels the Guadalupe Escarpment. It is a highly sensitive visual area because it is within the immediate visual foreground as viewed from several key observation points along U.S. Highway 62/180. It is a primary viewshed from the Carlsbad Caverns wilderness area and USFS scenic areas. Management of the area emphasizes the protection of visual resource values associated with the Guadalupe Escarpment while still allowing for compatible multiple-use development.

3.4.4.1.7 Hackberry Lake OHV Use Area

This intensive OHV use area consists of 55,800 acres of rolling stabilized dune lands and cliffs. The area is used annually for competitive motorcycle events. It is also popular for motorcycle and other OHV use. The area is heavily developed for oil and gas. Coordination with the oil and gas industry to avoid specific routes and trails should pose no management problem. Management objectives are to manage as an intensive OHV use area and avoid conflicts with other land uses that would continue to be authorized.

3.4.4.1.8 Laguna Plata

The Laguna Plata Archaeological District has been declared eligible for the NRHP. The district contains 3,360 acres of BLM-administered land. The area is still essentially undisturbed despite some salt mining on the playa bottom and Mississippi Chemical Corporation's use of Laguna Plata for emergency brine water disposal. The district is a complex of many sites with surface and subsurface cultural materials demonstrating that the area was used repeatedly over a lengthy time period. Management objectives of this archaeological district are to protect and preserve the important and sensitive cultural resource values for research purposes.

3.4.4.1.9 Maroon Cliffs

This 11,783-acre area has been determined eligible for the NRHP as an archaeological district. The archaeological sites recorded thus far are open campsites dating from the Archaic period (5000 B.C.) to the Jornada Mogollon period (A.D. 900–1450). Pit house structures have been reported at Maroon Cliffs; however, excavation is required to confirm this report. The Maroon Cliffs area is topographically diverse, providing a variety of exploitable environments for prehistoric peoples. The Maroon Cliffs Archaeological District is an ideal laboratory for the study of human-environment adaptations in southeastern New Mexico. The main objective of this archaeological district is to protect and preserve the important and sensitive cultural resource values for research.

3.4.4.1.10 Pecos River Corridor

The Pecos River Corridor (6,000 acres) contains a 0.5-mile strip of BLM-administered land along the Pecos River and the area surrounding the Red Bluff Reservoir. The area emphasizes water-based recreation along the free-flowing Pecos River and provides semi-primitive motorized recreation opportunities. The area around Red Bluff Reservoir is developed for day and overnight use to include campsites, picnic sites, sanitation facilities, and a boat ramp. Public access is provided along the river. Management objectives provide protection for scarce water-based recreation, provide public access, and protect the natural values while allowing for semi-primitive motorized recreation. Management goals are to reduce soil erosion and vegetation destruction while still allowing leasable minerals and other resource development in the area.

3.4.4.1.11 Phantom Banks Heronries

This SMA consists of habitat areas for colonial birds and varies in description from salt lakes to wooded draws. There are currently seven known heronries supporting nesting habitat for great blue herons (*Ardea herodias*), black-crowned night-herons (*Nycticorax nycticorax*), little herons (*Egretta caerulea*), tricolored herons (*Egretta tricolor*), snowy egrets (*Egretta thula*), and cattle egrets (*Bubulcus ibis*). Maps and legal locations would not be provided for these areas since colony locations change and these species are very susceptible to human disturbance. Management objectives for these habitat areas are to protect and enhance habitat for colonial birds in southeast New Mexico.

3.4.4.1.12 Poco Site

This SMA consists of 51 acres and is a prehistoric multicomponent site that has retained much of its stratigraphic integrity and, until recently, has not suffered any significant disturbance from oil and gas development. Undisturbed stratified sites are rare in southeastern New Mexico and the information they contain is critical to understanding the regional prehistory. In addition, the Poco Site may contain very rare pit house structures. Management objectives for this area are to protect and preserve the important and sensitive cultural resource values for research.

3.4.4.1.13 Pope's Well

This 40-acre historic site contains artesian well drill sites and stone remains of the army camp used by Captain John Pope in the mid-1850s. The camp and wells were constructed while trying to establish reliable water sources for the proposed southern route of the transcontinental railroad. This site is listed in the NRHP. Management objectives for this site are to protect and preserve the important and sensitive historic resources for research and education.

3.4.4.1.14 Potash Bull Wheel

The Potash Bull Wheel is a historic structure consisting of two wooden wheels connected by a wooden shaft. The structure itself was situated in a 4-acre protective buffer. This structure was used in the drilling of a 1925 well that failed to locate significant quantities of potash. This site was also determined eligible for the NRHP. Management objectives for this historic site were to interpret, protect, and minimize deterioration of the unique historic structure.

The Potash Bull Wheel was removed from its original location in September 1993. It was brought to the CFO and refurbished and was then moved into a mining history museum and interpretive center. This was done with partnerships between the potash industry, the BLM, the City of Carlsbad, and Eddy County. The Potash Bull Wheel is currently available for public viewing in the Pecos River Village Conference Center.

3.4.4.1.15 Seven Rivers Hills

This 540-acre area of bare gypsum hills was the only known habitat for gypsum wild-buckwheat for 90 years. This area is federally designated as critical habitat and is one of only three known populations of this species. This area also provides habitat for other unique and endemic vegetation existing on gypsum soils. Most of the area consists of bare steep slopes and deep eroded arroyos. The main objectives of this SMA are to protect and enhance habitat for gypsum wild buckwheat and other endemic plant species.

3.4.4.1.16 Springs Riparian Habitat

These six springs consisting of 524 acres support critical riparian habitat within the Chihuahuan Desert ecosystem. Bogle Flat, Preservation, Cottonwood, Owl, Ben Slaughter, and Blue Springs are primarily located within gypsum karst and drainage areas that flow into the Pecos River System. These areas provide habitat for listed endangered species as well as important habitat for a variety of plants and animals. Management objectives for these areas are to protect and enhance ecological condition for the springs and associated riparian zones.

3.4.5 Backcountry Byways

The Guadalupe National Backcountry Byway was designated on September 26, 1994, as a component of the National Scenic Byways Program of the Federal Highway Administration. The National Scenic Byways Program is an effort established to help recognize, preserve, and enhance selected roads throughout the United States. The Guadalupe National Backcountry Byway stretches for 55 miles along New Mexico Highway 137, 30 miles of which are managed by the BLM. The byway is a paved two-lane road accessible in a passenger car. Low vehicle speeds are required in the winding canyons and on the steep Guadalupe Escarpment switchbacks.

The byway travels the transition from cholla cactus in the Chihuahuan Desert west of Carlsbad up into the pines of the dramatic Guadalupe Escarpment. Travelers can see mule deer, pronghorn, gray fox, scaled quail, mourning dove (*Zenaida macroura*), a variety of songbirds, and small mammals. Geologically, the byway is situated along the Capitan Reef complex, which marks one edge of the Permian Basin. The BLM developed three pullouts along the byway with shelters, picnic tables, trash receptacles, cable fencing, and native landscaping. In addition, kiosks at the pullouts highlight the local petroleum industry, the geology of the ancient reef, and the area's caves. Activities along the byway include hiking, wildlife viewing, hunting, bird watching, geologic sightseeing, historic sites, plant viewing, scenic driving, educational interpretation, and caving.

3.4.6 Wild and Scenic Rivers

Congress enacted the Wild and Scenic Rivers Act (WSRA) (16 USC 1271–1287) on October 2, 1968, to address the need for a national system of river protection. As an outgrowth of a national conservation agenda in the 1950s and 1960s, the WSRA was a response to the dams, diversions, and water resource development projects that occurred on America's rivers between the 1930s and 1960s. The WSRA

stipulates selected rivers should be preserved in a free-flowing condition and be protected for the benefit and enjoyment of present and future generations. Since 1968, the WSRA has been amended many times, primarily to designate additional rivers and to authorize the study of other rivers for possible inclusion.

Section 5 (d)(1) of the WSRA directs federal land management agencies to consider potential wild and scenic rivers in their land and water planning processes, stating, "In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas." To fulfill this requirement, the BLM evaluates river and stream segments to determine whether they might be eligible for inclusion in the National Wild and Scenic Rivers System (NWSRS) whenever it undertakes a land use planning effort such as an RMP.

Consideration of whether a river should be designated for inclusion in the NWSRS can be broken into three phases:

- **Determination of Eligibility:** Federal agencies conduct an evaluation of river features to determine which rivers qualify to be added to the NWSRS.
- **Determination of Suitability:** Most commonly, federal agencies conduct a review and then recommend to Congress which rivers should be protected.
- **Designation:** Congress designates a river as wild, scenic, or recreational.

3.4.6.1 Determination of Eligibility

The CFO conducted an eligibility study as part of the RMP process on the five river segments occurring within the CFO planning area and published an eligibility report (BLM 2012). These five segments and a summary of the eligibility results are presented in Table 3-33.

Table 3-33. Summary of Eligibility Determination Findings

River	Segment Length Including Non-BLM-administered Lands (miles)	Segment Length Occurring Only on BLM-administered Lands (miles)	Free-Flowing Determination (Y/N)	Outstanding Remarkable Values								Eligible (Y/N)
				Scenic	Recreation	Geologic	Fish	Wildlife	Cultural	Historic	Other	
Black River	3.67	3.67	Y	X	–	X	X	X	–	–	–	Y
Delaware River	8.54	8.22	Y	–	–	–	X	X	X	–	X	Y
Pecos River Segment 1	2.4	2.4	Y	–	–	–	–	–	–	–	–	N
Pecos River Segment 2	7.12	6.44	Y	–	–	–	–	–	–	–	–	N
Pecos River Segment 3	5.53	4.04	Y	–	–	–	–	–	–	–	–	N

Although all five river segments met the free-flowing determination, there were only two river segments that met the eligibility determination: the Delaware and Black Rivers. The Black River's outstanding remarkable values that helped it meet eligibility were as follows: Scenic, Geologic, Fish, and Wildlife. The Delaware River's outstanding remarkable values that helped it meet eligibility were as follows: Fish, Wildlife, Cultural, and Paleontology listed under Other.

3.4.6.2 Determination of Suitability

The purpose of the suitability phase of the study process is to determine whether eligible rivers would be appropriate additions to the NWSRS by considering resource values, level of public support, and competing uses of the river corridor. The suitability evaluation does not result in actual designation but only a determination or the river segment's suitability for designation. The BLM cannot administratively designate

a stream via a planning decision or other agency decision into the NWSRS, and no segment studied is designated or would be automatically designated as part of the NWSRS. Rivers found not suitable by the managing agency conducting the suitability study would be dropped from further consideration and managed according to the objectives and specific management prescriptions outlined in the RMP (see Section 3.2.2.3).

The river segments are also evaluated for classification as "wild," "scenic," or "recreational." The three classification categories for eligible rivers are defined as follows:

- Wild Rivers: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive.
- Scenic Rivers: Those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible by roads.
- Recreational Rivers: Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

The CFO conducted a suitability study and published a suitability report (BLM 2013). For the two eligible segments identified above, the Black River and Delaware River, the preliminary determinations and tentative classifications are presented in Table 3-34.

Table 3-34. Preliminary Suitability Determinations for Eligible Segments

River	Preliminary Determination	Tentative Classification
Black River	Suitable	Recreational
Delaware River	Suitable	Scenic

Impacts that would occur from designating or not designating the suitable river segments are presented in Chapter 4. The BLM will consider public review and comment on the above suitability determinations before making final suitability determinations.

3.4.7 Wilderness Study Areas

In 1964, Congress passed the Wilderness Act, establishing a national system of lands for the purpose of preserving a representative sample of ecosystems in a natural condition for the benefit of future generations. Until 1976, most land considered for, and designated as, wilderness was managed by the NPS and USFS. With the passage of FLPMA in 1976, Congress directed the BLM to inventory, study, and recommend BLM-administered lands for wilderness designation. To be designated as wilderness, an area has to have the following characteristics:

- **Size:** roadless areas of at least 5,000 acres of public lands or of a manageable size.
- **Naturalness:** generally appears to have been impacted primarily by the forces of nature.
- **Opportunities:** provides outstanding opportunities for solitude or primitive and unconfined types of recreation.

In addition, areas often have special qualities, such as ecological, geological, educational, historical, scientific, and scenic values.

WSAs are areas determined to meet wilderness eligibility requirements, but for which Congress has not acted on the managing agency's recommendation. They are managed in accordance to interim management guidelines to maintain the wilderness characteristics until Congress acts. There are no Congressionally designated wilderness areas within the planning area; however, there are four WSAs.

A New Mexico Statewide Wilderness Study Report was completed in 1991 by the BLM (BLM 1991a). In this study, the BLM described all WSAs in New Mexico. Each WSA was either recommended or not recommended for designation as wilderness areas. Regardless of the BLM's recommendation, the BLM must manage each area as a WSA until Congress designates these areas a wilderness area or releases them for other uses.

3.4.7.1 Existing WSAs

Currently, there is no designated wilderness in the planning area. Table 3-35 identifies the four WSAs pending Congressional action and Map 3-36 of Appendix B shows their location within the planning area. Chapter 2, Table 2.50 outlines their management under each alternative.

Table 3-35. Designated Wilderness Study Areas

Name	Acres	Reason for Designation
Devil's Den Canyon	297	Erosive soils
Lonesome Ridge	3,702	Visual, outstanding natural area, protection of natural values
McKittrick Canyon	185	Fragile soils
Mudgetts	2,902	Federally listed species, research opportunities, biological
Total	***7,086***	

A more complete description of each WSA and the evaluation of its wilderness values are contained in the New Mexico Statewide Wilderness Study, Volume 3, Wilderness Analysis Reports (BLM 1988). The BLM's recommendations to Congress regarding which WSAs or portions of WSAs should be designated as wilderness are described in the New Mexico Wilderness Study Report, Volume 1, WSA Recommendations (BLM 1991a). The recommendation for each area is stated following the description of each WSA. A majority of the acreages included have been derived from GIS data; some acreages are referenced from the best available information in previous documents.

3.4.7.1.1 Devil's Den Canyon WSA

The Devil's Den Canyon WSA contains 297 acres and is located in the southwestern corner of Eddy County, approximately 41 miles southwest of Carlsbad. The Devil's Den Canyon WSA encompasses not only the escarpment, but also the mouth of Devil's Den Canyon. This is an unusually deep canyon cutting through the western escarpment of the Guadalupe Mountains. Devil's Den Canyon carries water following heavy rains. The perennial Devil's Den Spring is located approximately 0.5 mile up the canyon from the WSA on USFS land.

Portions of the Devil's Den Canyon WSA were determined to have high wilderness values, but were not recommended for wilderness designation, as the contiguous Guadalupe Escarpment WSA was not itself recommended. The area is too small to be managed alone. In addition, the USGS identified high oil and gas potential in Devil's Den Canyon WSA. There was also strong public opposition to designating this WSA as wilderness, which was the primary reason for the recommendation not to designate Devil's Den Canyon as wilderness.

3.4.7.1.2 Lonesome Ridge WSA

The Lonesome Ridge WSA contains 3,702 acres and is located in the southwestern corner of Eddy County, approximately 41 miles southwest of Carlsbad. The Lonesome Ridge WSA lies at the mouth of Big Canyon, a major drainage that cuts through the 2,000-foot Guadalupe Escarpment. Elevations range from 4,800 feet above sea level on the talus slopes to 6,825 feet at the ridge top. The spectacular topography of this WSA includes vertical limestone cliffs, serrated ridges, and deep canyons.

This WSA was not recommended for a wilderness designation. This recommendation was based on the fact that the contiguous Guadalupe Escarpment WSA was not suitable for recommendation. In addition, the Lonesome Ridge area is too small to be managed alone, and because it lacks strong public support for a wilderness designation.

The 1988 RMP designated 2,990 acres of the Lonesome Ridge WSA as an ACEC/ONA. The ACEC/ONA is managed to protect the area's scenic, wildlife, plant, geologic, and natural history values. Planned actions include closing the area to mining claim location and mineral material sales, controlling surface use on oil and gas leases, and closing the area to OHV use. The 1993 approved management plan designated OHV use and implemented the plan as closed to OHV use.

3.4.7.1.3 McKittrick Canyon WSA

The McKittrick Canyon WSA contains 185 acres and is located in the southwestern corner of Eddy County, approximately 45 miles southwest of Carlsbad. The WSA is contiguous with the USFS Guadalupe Escarpment WSA. The McKittrick Canyon WSA is almost entirely on the western slope of the Guadalupe Escarpment.

The 185-acre McKittrick Canyon WSA was determined to have low-quality wilderness values and high potential for the existence of oil and gas. This WSA also had strong public opposition to designate it as wilderness, which was the primary reason for the recommendation not to designate McKittrick Canyon WSA as wilderness. This WSA was also not recommended for a wilderness designation because the contiguous USFWS Guadalupe Escarpment WSA was not suitable for recommendation. In addition, the WSA area does not meet minimum acreage requirements.

3.4.7.1.4 Mudgetts WSA

The Mudgetts WSA is located in Eddy County, approximately 19 miles southwest of Carlsbad. The WSA contains 2,902 acres of BLM-administered land. The southern boundary of the WSA is contiguous with a designated wilderness area in Carlsbad Caverns National Park. The remainder of the WSA is delineated by a combination of roads and state or private boundaries.

The Mudgetts WSA is located on the northeastern edge of Guadalupe Ridge, which is a major eastern spur of the Guadalupe Mountains. Elevations range from 4,000 to 4,900 feet above sea level. Most of the area consists of steeply rolling hills, with steep cliffs on the western edge that drop as much as 500 feet to the floor of the Serpentine Bends of Dark Canyon. Dark Canyon and Crooked Creek drain the WSA. Both of these drainages carry water only as flash floods following heavy rains.

In accordance with a decision made in the 1988 RMP, 1,480 acres of the WSA were designated as the Dark Canyon ACEC. The Dark Canyon ACEC is managed to protect scenery, caves, and threatened and endangered plant species. Planned actions include closing the area to mineral material sales, limiting oil and gas leases to NSO, and limiting motorized vehicle use to designated routes.

The determination that the WSA has a high potential for oil and gas was made by BLM mineral specialists based on current production, initial well tests, and known geologic structure status near and within the WSA. The WSA is surrounded by natural gas production and most of the WSA is leased for oil and gas production.

The majority of the WSA could not be managed to preserve existing wilderness values in the long term because of the presence of valid existing oil and gas leases. All six of the oil and gas leases in the WSA are held because there are oil wells in production.

3.5 SOCIAL AND ECONOMIC CONDITIONS

3.5.1 Tribal Rights and Interests

Seven Native American tribes have interests in the planning area (Table 3-36).

Table 3-36. Native American Tribes with Interests in the Planning Area

Native American Tribes
Pueblo of Isleta
Mescalero Apache Tribe
Ysleta del Sur Pueblo
Apache Tribe of Oklahoma
Comanche Indian Tribe
Kiowa Tribe of Oklahoma
Hopi Tribe

The Mescalero Apache Tribe identified several Traditional Cultural Properties (TCPs) located in the planning area during an ethnographic inventory conducted by TRC (2010). TCPs are properties that are eligible for the NRHP based on their association with cultural practices or beliefs of a living community that 1) are rooted in that community's history, and 2) are important in maintaining the continuing cultural identity of the community (Parker and King 1998:1). There are unidentified TCPs in the planning area according to the Mescalero Apache; however, the tribe did not disclose those locations to the BLM (BLM 2013). Tribal sacred sites and places of traditional, religious or cultural importance are not necessarily eligible for the NRHP, but the American Indian Religious Freedom Act and Executive Order 13007 charge the agency with protecting these localities, consistent with other rights, and ensuring tribal access to them.

Table S.28 in Appendix S lists the types of TCPs and their associated resources/points of recognition developed by TRC (2010) to guide field inventory.

Consultation with Native American tribes typically occurs once per year during the annual oil and gas lease sale process when the BLM requests that a tribe identify any parcels that are in or near any areas of interest to the tribe. This early consultation allows the BLM to process the subsequent undertakings on those parcels for oil and gas and other similar projects. Consultation with tribes is undertaken for projects not related to oil and gas when proposals are received by the BLM, such as data recovery plans, or changes in management strategies such as the Permian Basin PA. In order to consult more meaningfully with tribes, the CFO conducted face-to-face meetings with all of the tribes during July and August 2012 (see Section 5.3 for a full summary of tribal consultation conducted for this RMP effort).

3.5.2 Social and Economic Conditions

The CFO manages approximately two million acres of public lands under BLM jurisdiction in southeast New Mexico. The following section introduces the socioeconomic study area (SESA), provides a brief regional history of the area, characterization of the local communities and demographic characteristics. The section also highlights the regional economic activity (employment, earnings, etc.), economic activities specifically related to CFO lands (recreation, mining, agriculture, etc.), and fiscal conditions. A brief review of local economic development plans is also provided. As set forth by Executive Order 12898, the section also identifies potential environmental justice communities.

3.5.2.1 Socioeconomic Study Area

The CFO resource management planning area includes lands in all of Eddy and Lea Counties and a portion of Chaves County. Reference to the CFO planning area refers specifically to the BLM-administered lands within the CFO boundaries. To capture the social and economic conditions, trends, and potential impacts of proposed BLM CFO management decisions on communities in and around the project area, the SESA

for the Carlsbad RMP is composed of Chaves, Eddy, and Lea Counties. The broader definition of the SESA (relative to the planning area) reflects a combination of practical limitations regarding available data (most economic data are published at the county-wide level) and the recognition that economic and demographic effects from CFO management decision also affect surrounding communities. The broader SESA definition provides a more comprehensive view of regional social and economic conditions and trends that may be affected by CFO management decisions.

It is important to note that the SESA borders the state of Texas. Some of the social and economic conditions and indicators presented in this study may also apply to or be impacted by Texas border communities or be influenced by cross-border factors such as commuting to or from Texas for employment within the SESA.

3.5.2.2 Social and Economic Regional Context

Human use of the SESA began more than 10,000 years ago, when nomadic hunters and gatherers utilized the landscape. Through time, native peoples moved in and out of the area in increasing numbers, and by the time of Euro-American contact in the sixteenth century, natives had established permanent farming communities along the Pecos River and utilized upland resources in season. The SESA was also used by nomadic native hunters who moved with herds of large game. The area is also considered part of the ancestral home of some Apachean groups.

Spanish, and later Mexican, settlers introduced domestic livestock production into the economy of the SESA in the seventeenth century. In the mid-1800s, Anglo cattle ranchers and farmers began settling the area, now known as Chaves County. Farming and sheep and cattle ranching have been productive ways of life in the area due to the artesian wells located in the area. Chaves County is one of the largest milk and dairy producing counties in the nation. While the agricultural industry remains an integral part of the local heritage and economy, oil and gas development has also been an important factor in the community since the 1930s (Chaves County 2009). Roswell is the county seat and the largest city in the county with a population of 48,336. The “Roswell Incident” of 1947, allegedly involving the discovery of remains of a flying saucer outside the city, provides unique community character and numerous tourists to the area during the annual UFO festival (Southeastern New Mexico Economic Development District [SNMEDD] 2011).

Cattle grazing and farming along the Pecos River drew Anglo settlers in current-day Eddy County in the last half of the 1800s. These settlers expanded on earlier native and Spanish irrigation systems, which allowed for increased agricultural production in the area. Today, farming and ranching remains an important way of life and residents are interested in preserving farmland and water supply for future generations (Eddy County 2008). Natural resource extraction has been important to the economic development in Eddy County. The area is reported to contain oil and gas deposits and some of the largest potash deposits in the United States (SNMEDD 2011). Tourism became an economic driver for Eddy County as Carlsbad Caverns was declared a National Monument in 1923 and became a National Park in 1930. In recent years the National Park has drawn approximately 400,000 visitors annually. In addition to visiting Carlsbad Caverns, local residents enjoy recreation opportunities on and along the Pecos River, Living Desert Zoo, and Gardens State Park. Eddy County residents report valuing the “country feeling,” temperate climate, low crime rates, and a “generally good quality of life” (Eddy County 2008). Carlsbad is the county seat and the most densely populated city in the county. Artesia, Loving, and Hope are other incorporated more densely populated areas within Eddy County.

Lea County, the southeastern-most county of New Mexico, was sparsely populated and connected by wagon trails to other communities until oil was discovered in the Hobbs oil field in 1928. While the county has been subject to numerous boom and bust cycles, it has consistently been one of the state’s leading producers of oil and gas (Lea County 2009). Like the other counties in the SESA, agricultural activities such as ranching, farming, and the dairy industry also contribute to the Lea County economy (SNMEDD 2011). The state correctional facility is in Lea County. Hobbs is the largest city in the county and serves as the commercial center of the county.

3.5.2.3 Social Organization/Communities of Interest

Natural resource development and use has shaped the social and economic landscape of the SESA. Ranching, oil and gas development, potash mining, and recreation have all been important factors in creating the current socioeconomic conditions in southeastern New Mexico. Based on their connection to land within the SESA, several stakeholder groups are identified below.

3.5.2.3.1 Ranchers

For over 100 years ranchers and their families have been gazing livestock in the SESA. Eddy County reports that the number of farms in the area peaked in 1997 but has since remained steady (Eddy County 2008). Grazing and farming generate economic activity for the area and provide a unique way of life for residents in the SESA. Using the land for grazing and farming preserves the small town feeling of many communities and preserve the open space, which is of value to rural residents (Eddy County 2008).

3.5.2.3.2 Recreationists

Recreationists in the SESA enjoy numerous opportunities for dispersed recreation. The most popular uses include OHV use, hunting, horseback riding, and geocaching (BLM 2011). These recreation opportunities often shape individual and community identities and contribute to the visitors' perceived quality of life. Based on the array of recreation opportunities and user groups who enjoy them, there is a potential for user conflict between groups. However, user conflicts between recreationists do not appear to be an issue of concern within the CFO's jurisdiction.

The motorized recreation user groups enjoy OHV excursions on dirt roads, single-track trails, and cross-country travel over lands where no established trail exists (which is only permissible in specified BLM OHV areas such as the Hackberry Lake OHV area). In February 2012 there were 3,830 registered OHVs (ATVs and motorcycles) in Lea, Eddy, and Chaves Counties. This represents a 58% increase in registered use since 2005 when 1,596 were registered in the three-county area. It should be noted that a portion of the increase is attributed to the increase in patrols and enforcement of registering OHVs with the State of New Mexico (David Chester, NMDGF, personal communication with Laura Vernon, SWCA Environmental Consultants, February 2012). The Hackberry Lake OHV Area provides 55,000 acres of sand dunes and a variety of topographic features for OHV travel. The annual Carlsbad 100 Desert Race is held at the Hackberry Lake OHV Area and attracts 80 to 200 riders annually.

Equestrian groups utilize lands within the CFO planning area for recreational purposes. The La Cueva Non-Motorized Trail System is used by horseback riders, mountain bikers, and hikers. Individuals in equestrian groups have expressed interest in establishing a cross-country equestrian route and associated amenities, including hitching posts, watering units, and horse camp areas (BLM, personal communication 2010).

3.5.2.3.3 Individuals Who Place a High Priority on Natural Resource Uses

Potash mining and oil and gas development have been intrinsic to shaping the communities within the SESA. Residents within the SESA have experienced the boom and bust cycles of natural resource extraction since the early 1900s. As of October 2011, there were 15,885 active oil and gas wells in the CFO planning area. There are currently two active potash mines within the CFO planning area and two proposed projects (HB In-Situ Solution Mine Project and Ocha Project) that are now going through the NEPA process. Tension between the oil and gas industry and the potash industry has been present for decades. The tension is due to the fact that both industries maintain competing economic interests for collocated resources and from concerns regarding potential safety and liability associated with concurrent development by both industries (BLM 2012d).

3.5.2.3.4 Individuals Who Place a High Priority on Resource Protection

Individuals and advocacy groups support the protection and restoration of lands with wilderness-like characteristics. These individuals and groups value the preservation of natural resources. While some of the stakeholders may engage in active recreation uses such as hiking or camping, others may find joy in

more passive uses such as just knowing the undeveloped landscape is there or sharing stories or photographs of the area. Public scoping and workshop attendance indicate that the New Mexico Wilderness Alliance is interested in the protection of lands in and around the CFO planning area.

3.5.2.4 Population

The SESA is rural in nature with approximately 13 persons per square mile (14,663 total square miles). Within the three counties in the SESA, the population of Lea County has grown the fastest in the recent decade (16.6%), after a slight decline from 1990 to 2000 (-0.5%). Eddy and Chaves counties have been growing steadily over the past two decades, with a slight lag in population growth for Eddy County in the more recent decade.

The populations of all of the cities within the subject area have grown since 1990. The population of Carlsbad increased at a higher rate from 1990 to 2000 (2.7%) than from 2000 to 2010 (2.0%). Hobbs experienced a slight drop in population from 1990 to 2000 (-1.6%) and then rebounded from 2000 to 2010 (19.1%). The population of Jal declined from 1990 to 2000 (-7.4%) but then increased slightly from 2000 to 2010 (2.6%). Artesia's population increased at a higher rate in the more recent decade (5.7) than it did from 1990 to 2000 (0.2%).

As shown in Table 3-37 below, the three counties in the subject area have experienced an approximate 9.3% population increase from 2000 to 2010.

Table 3-37. Population Data, 1990, 2000, 2010, and 2020

Area	Resident Population				Percent Population Change		
	1990 Census	2000 Census	2010 Census	2020 Projection	1990–2000 (Actual)	2000–2010 (Actual)	2010–2020 (Estimate)
New Mexico	1,515,069	1,819,046	2,059,179	2,540,145	20.1	13.2	19.0
Eddy County	48,605	51,658	53,829	58,284	6.3	4.2	8.2
Carlsbad	24,952	25, 625	26,138	N/A	2.7	2.0	N/A
Artesia	10,610	10,692	11,301	N/A	0.8	5.7	N/A
Lea County	55,765	55,511	64,727	67,479	-0.5	16.6	4.2
Hobbs	29,115	28,657	34,122	N/A	-1.6	19.1	N/A
Jal	2,156	1,996	2,047	N/A	-7.4	2.6	N/A
Chaves County	57,849	61,382	65,645	66,933	6.1	6.9	1.9
Roswell	44,480	45,293	48,366	N/A	1.7	6.8	N/A
SESA	162,219	168,551	184,201	192,696	3.9	9.3	4.6

Source: U.S. Census Bureau 2000a, 2010a; Bureau of Business and Economic Research 2008.

The median age of population in the SESA has remained relatively unchanged from 2000 to 2010 with a very slight decrease from 34.9 to 34.7 (averaged over the three counties). Chaves and Lea Counties' median age just slightly decreased over this period, while Eddy County slightly increased from 36.4 to 37.8. Eddy County also has the highest median age of the three being 3.1 years higher than Chaves County and 6.1 years higher than Lea County.

Discussed more comprehensively in the Environmental Justice section, approximately 74% of the population within the SESA are identified as Caucasian. Approximately 2.5% identify themselves as African American and 1.3% identify themselves as American Indian/Alaskan Native. Nearly half of the residents in the three-county area (49%) identify themselves as Hispanic or of Latino origin. According to the U.S. Census Bureau, people who identify with the terms "Hispanic" or "Latino" are identifying their origin, heritage, nationality group, lineage, or country of birth of the person or the person's parents or ancestors before their arrival in the United States. Someone who identifies themselves as Spanish, Hispanic, or Latino can be of any race.

3.5.2.5 Housing

The 2010 Census data in Table 3-38 illustrate how housing stock has changed minimally over the past decade. In Eddy County there was a 1% increase in new housing units from 2000 to 2010, while the population increased 4.2% over the same period. Eddy County reports a shortage of single-family homes for middle-income workers and a scarcity of rental units in Carlsbad and Artesia (Eddy County 2008).

The City of Carlsbad completed a Housing Analysis and Strategic Plan in 2009 (City of Carlsbad 2009). The main findings of the housing analysis were that:

- Carlsbad is experiencing a housing shortage that affects the community's quality of life and hinders the expansion of the local economy.
- Young, working families and retirees comprise the primary market for housing. The greatest need is for multi-family rentals, particularly multi-bedroom units. A need also exists for single-family detached homes.
- Rehabilitation or replacement of older and poorly maintained housing is another identified need.
- There is an unmet demand for low-income housing.
- Constraints and impediments to the development of new housing in Carlsbad include the absence of utility (water, wastewater, and storm drainage) infrastructure in certain areas and difficulty in obtaining financing in the 2010 housing market.

Despite these constraints, some active residential subdivision construction activity is occurring in the Carlsbad community. Two single-family home subdivisions totaling 285 units have been approved and construction has commenced (City of Carlsbad 2009). In 2010 two other subdivisions received zoning approval; one is zoned for 200 apartment units and 100 single-family homes, the other is zoned for 185 apartments (BLM 2012d).

While Lea County's population has continued to grow over the last decade, due in large part to the surge in oil and gas development, their housing supply has not. As indicated in Table 3-38, the percent of vacant units decreased from 16% in 2000 to 11% in 2010. Vacancy rates in Hobbs and Lovington have fallen below 10% (Lea County 2011). Over the past decade many of the vacant homes in Hobbs, Lovington, and Tatum have been rehabilitated or demolished. However, the percent of vacant units within the county do include homes that are not suitable for occupation and require substantial rehabilitation. According to the Lea County Affordable Housing Plan, the county is currently enduring:

- An aging housing stock that has deteriorated during the "bust" periods of the oil and gas boom and bust cycles.
- An inadequate number of affordable homes and rentals.
- A stalled housing market in the communities outside Hobbs that has made new housing development difficult.
- Rapidly increasing housing costs and rental prices in Hobbs have been problematic for low-income residents who are finding themselves priced out of the local housing market (Lea County 2011).

Table 3-38. Available Housing Characteristics, 2000–2010

Area	2000 Number of Units	2000 Number of Vacant Units	2000 Percent Vacant	2010 Number of Units	2010 Number of Vacant Units	2010 Percent Vacant
New Mexico	780,579	103,608	13%	901,338	109,993	12%
Eddy County	22,249	2,870	13%	22,585	2,174	10%
Lea County	23,405	3,706	16%	24,919	2,683	11%
Chaves County	25,647	3,086	12%	26,697	3,006	11%

Source: U.S. Census Bureau 2000b, 2010b.
Note: All 2010 median numbers are from the 2008–2010 American Community Survey and reflect a three-year average estimate.

Housing values, mortgages, and rental costs in the three-county area are considerably lower than New Mexico as a whole (Table 3-39). While housing values increased over $40,000 in New Mexico from 2000 to 2010, values increased no more than $30,000 within the SESA. Median monthly rental costs in Eddy and Lea Counties have outpaced the rental costs increases in Chaves County and New Mexico as a whole. This disproportionate increase may reflect the increase in demand and lack of availability in affordable rental units.

Chaves County reports a slight shortage in vacant housing units and affordable housing but this shortage does not compare to those in Eddy and Lea Counties (Marlin Johnson, Planning and Zoning Director, Chaves County, personal communication with Laura Vernon, SWCA Environmental Consultants, February 2012).

Table 3-39. Housing Values and Costs, 2000–2010

Area	2000 Median Housing Values	2000 Average Monthly Mortgage Costs	2000 Median Monthly Rental Costs	2010 Median Housing Values	2010 Average Monthly Mortgage Costs	2010 Average Monthly Rental Costs
New Mexico	$108,100	$929	$503	$150,500	$1,202	$691
Eddy County	$64,200	$685	$394	$86,100	$958	$628
Lea County	$50,100	$607	$388	$81,800	$960	$661
Chaves County	$61,000	$618	$402	$80,800	$878	$571

Source: U.S. Census Bureau 2000b, 2010b.
Note: All 2010 median numbers are from the 2008–2010 American Community Survey and reflect a three-year average estimate.

3.5.2.6 Regional Economic Activity

3.5.2.6.1 Economic Output and Gross Regional Product

Economic output is a measure of the value of industry production over a given period and, for most sectors, reflects gross receipts. For example, in manufacturing, output is equal to sales plus/minus change in inventory; in service industries, output is equal to sales. Gross regional product (GRP) measures the overall size of the economy of a specified region and is defined as gross economic output minus intermediate inputs (purchases from other sectors). Each sector's contribution to GRP is called "value added." Thus the value added for each sector reflects that sector's economic output net of purchases of intermediate inputs.

The 2010 industry breakdown of output and value added for the SESA is shown in Table S.29 in Appendix S. In 2010, the sum of value added across all industries (the GRP for the SESA) was $7.6 billion. The mining sector contributed the most total value added to the SESA, accounting for 28% of GRP, followed by government (11% of GRP), real estate (9% of GRP), and manufacturing (7% of GRP).

3.5.2.7 Total Employment and Employment by Sector

Table 3-40 displays the number of jobs located in the SESA from 1970 to 2009. All three counties are similar in their total number of jobs and have generally experienced positive growth over the last three decades.

Table 3-40. Employment History by Place of Work, 1970–2009

Year	Chaves County		Eddy County		Lea County		New Mexico State Total	
	No. of Jobs	Average Annual Change	No. of Jobs	Average Annual Change	No. of Jobs	Average Annual Change	No. of Jobs	Average Annual Change
1970	17,142	–	16,188	–	21,061	–	398,899	–
1980	23,034	3.0%	21,651	3.0%	29,724	3.5%	597,040	4.1%
1990	26,928	1.6%	22,024	0.2%	27,298	-0.8%	761,396	2.5%
2000	27,733	0.3%	25,378	1.4%	28,290	0.4%	964,673	2.4%
2007	30,958	1.6%	29,136	2.0%	35,372	3.2%	1,100,589	1.9%
2009	30,951	0.0%	30,924	3.0%	35,245	-0.2%	1,072,999	-1.3%

Source: Bureau of Economic Analysis 2009a.

Total job growth in New Mexico from 2001 to 2009 was 11%. Growth in the SESA outpaced the state average at 13% in Chaves County, 20% in Lea County, and 23% in Eddy County. In Chaves County, over one-third of the new jobs added were in the mining and construction sectors. In Eddy and Lea Counties, approximately half of the new jobs added were in the mining and construction sectors.

A more in-depth evaluation of 2009 employment conditions in the SESA is displayed in Table S.30, Appendix S, which shows the share of jobs by industry in each county.

In both Eddy and Lea Counties, the mining industry supports the most jobs (16% and 22%, respectively), followed by government (13% and 11%) and retail trade (10%). Government is the largest industry in Chaves County, supporting 16% of all jobs, followed by healthcare (14%) and retail trade (12%).

Additional details for the mining sector within the SESA as a whole are displayed in Table S.31, Appendix S. Within the SESA, "mining and quarrying of nonmetallic minerals" was assumed to be primarily potash. Support activities for other mining were also assumed to be associated primarily with potash.

The mining sector within the SESA is dominated by oil and gas activities, which account for 91% of mining-related output, value added, and employment. Potash mining and its support activities account for 8% to 9% of output, value added, and jobs in the mining sector.

Table S.32 in Appendix S presents the five largest employers (both public and private) for the SESA counties.

3.5.2.7.1 Total Earnings and Earnings by Sector

Table 3-41 displays the average annual compensation per job[5] for workers in the SESA for selected years from 1970 to 2009. Compensation includes both wages and benefits and all estimates have been adjusted for inflation and are shown in 2011 dollars.[6] Although rural areas typically offer relatively low earnings, the SESA counties compare well to state averages.

Table 3-41. Earnings History

Year	Chaves County		Eddy County		Lea County		New Mexico State Total	
	Avg. Comp. per Job	Annual Change	Avg. Comp. per Job	Annual Change	Avg. Comp. per Job	Annual Change	Avg. Comp. per Job	Annual Change
1970	$34,303	–	$39,401	–	$41,730	–	$39,914	–
1980	$33,517	-0.2%	$41,388	0.5%	$46,840	1.2%	$40,240	0.1%
1990	$36,195	0.8%	$38,965	-0.6%	$35,575	-2.7%	$38,237	-0.5%
2000	$37,782	0.4%	$42,322	0.8%	$38,876	0.9%	$41,464	0.8%
2007	$43,310	2.0%	$53,417	3.4%	$50,220	3.7%	$45,593	1.4%
2009	$40,990	-2.7%	$54,765	1.3%	$49,753	-0.5%	$45,957	0.4%

Note: Compensation is adjusted for inflation and shown in 2011 dollars.
Source: Bureau of Economic Analysis 2009b.

[5] Compensation per job was calculated by dividing total compensation for the county (or state) by total jobs for that county (or state). The number of jobs, and average compensation per job, includes both full- and part-time jobs.
[6] Inflation adjustments were made according to the Bureau of Labor and Statistics Inflation Calculator.

All counties in the SESA witnessed wage escalation beyond New Mexico statewide averages between 2000 and 2007. After 2007, the economic downturn slowed wage growth in Eddy County and brought a slight decrease in real wage levels (net of inflation) in Chaves and Lea Counties. The overall increase in average wages in Eddy and Lea Counties from 2000 to 2009 reflects the growth of the mining and construction job sectors, which are typically high-paying industries.

Table S.33 in Appendix S displays industry-specific detail of the earnings per job in 2009. Estimates are adjusted for inflation and shown in 2011 dollars.

The manufacturing sector had the highest earnings per job in both Eddy and Lea Counties. In Chaves County, management of companies and enterprises was the highest paying industry. Mining was one of the highest paying sectors in all three counties.

High demand and highly skilled labor positions in construction, transportation, and real estate, often associated with energy development, pay well within Eddy and Lea Counties. However, professional services positions are paid below statewide averages.

3.5.2.7.2 Sources of Income and Net Commuting

Figure S.5 in Appendix S shows the distribution of personal income between earnings (wages and salaries, supplements to wages and proprietors' income); dividends, interest, and rent; and net transfer payments for New Mexico and the SESA.

The personal income distribution in the SESA as a whole is very similar to the state of New Mexico. Within the SESA, Chaves County has a slightly lower share of earnings by place of work and higher share of net transfer payments. Overall, the distribution has changed little since 2001.

The Bureau of Economic Analysis also reports a net commuting adjustment, which indicates whether income flows into the area as a result of out-commuting of residents to jobs elsewhere or income flows out of the area as a result of net in-commuting by people who reside elsewhere. The positive adjustment for Chaves County (1.3%) indicates that the income earned by residents commuting to work outside the county exceeds that of income earned by non-residents commuting into the county. Conversely, Eddy (-2.3%) and Lea (-0.9%) Counties have net in-commuting adjustments. The U.S. Census Bureau's Journey to Work and Local Employment Dynamics data confirm this commuting pattern (U.S. Census Bureau 2000d, 2009c).

3.5.2.7.3 Labor Force and Unemployment

The labor force of an area is the population of working-age residents that are currently employed or are unemployed but actively seeking work. It is important to note that "unemployed" is specifically defined and does not include the entire non-working population. The unemployment rate reflects the number of unemployed persons as a percent of the total labor force.

As a result of the economic recession that began in late 2008, unemployment in communities across the United States rose sharply and the SESA counties were no exception. In 2009, the U.S. unemployment rate rose to 9.3%, an increase of 3.5 percentage points over the previous year. In 2010 it rose again, though not as dramatically, to 9.6%. As shown in Figure S.6, Appendix S, the unemployment rate in the SESA rose sharply in 2009 but stayed below the national average.

Lea County experienced the most dramatic increase in unemployment, going from the lowest rate in the SESA in 2007 (2.3%) to the highest in 2009 (7.4%). Eddy County has maintained the lowest unemployment rate (6.0%) of the SESA in the wake of the economic crisis. Preliminary estimates for 2011 indicate that unemployment is decreasing in Chaves, Eddy, and Lea Counties.

3.5.2.7.4 Personal Income

Between 2000 and 2009, median household income in the United States decreased slightly when adjusted for inflation. However, income stayed flat or increased within the SESA (Table 3-42). In 2009 both Eddy and Lea Counties had a median household income above the state average.

Table 3-42. Median Household Income, 2009

Area	2000	2007–2009	Average Annual Change
United States	$55,331	$54,327	-0.2%
New Mexico	$44,973	$45,198	0.1%
Chaves County	$37,568	$37,692	0.0%
Eddy County	$42,160	$49,698	1.8%
Lea County	$39,263	$46,733	2.0%

Note: Income is adjusted for inflation and is shown in 2011 dollars.
Source: U.S. Census Bureau 2000c, 2009a.

In general, household income statistics reflect many factors, including the number of persons per household, household age, and the number of workers per household. Table 3-43 provides additional income statistics for the SESA.

Table 3-43. Average, Median, and per Capita Income, 2009

Area	Household		
	Median	Average	Per Capita
United States	$54,327	$74,457	$28,660
New Mexico	$45,198	$61,436	$23,850
Chaves County	$37,692	$50,117	$18,867
Eddy County	$49,698	$68,061	$26,220
Lea County	$46,733	$59,288	$21,501

Note: Income is adjusted for inflation and is shown in 2011 dollars.
Source: Census Bureau 2000c, 2009a.

By all measures, income in Chaves County trails the rest of the SESA and the state of New Mexico as a whole. Eddy County residents have the highest incomes with a median household income 32% greater than Chaves County's corresponding statistic.

3.5.2.8 Current Economic Activities Specifically Related to Lands Managed by the Bureau of Land Management Carlsbad Field Office

A wide spectrum of economic and social conditions in the SESA is influenced by the management and disposition of CFO lands. This subsection examines the economic activities most directly related to the management of CFO lands—livestock grazing, recreation, mineral extraction, and energy development. Unless otherwise indicated, the data in this section were provided by written communication with the CFO.

3.5.2.8.1 Livestock Grazing

Just over 200 livestock operators are permitted to graze livestock on public lands managed by the CFO. Over half of these (125) are in Eddy County. The total allotments provided forage for approximately 260,000 AUMs in 2010. In 2010, ranchers paid the CFO $1.35 per AUM and over the past 10 years, annual AUM revenue for the CFO has averaged $340,000. Figure 3-1 shows the changes in AUMS from 2000 to 2010. The active use offered is also displayed as a reference—if each operator ran full numbers, this would be the AUM count. Actual use has remained well below the full preference offered since 2000. As shown in Figure 3.5-5, most of the AUM allotments are used for cattle.

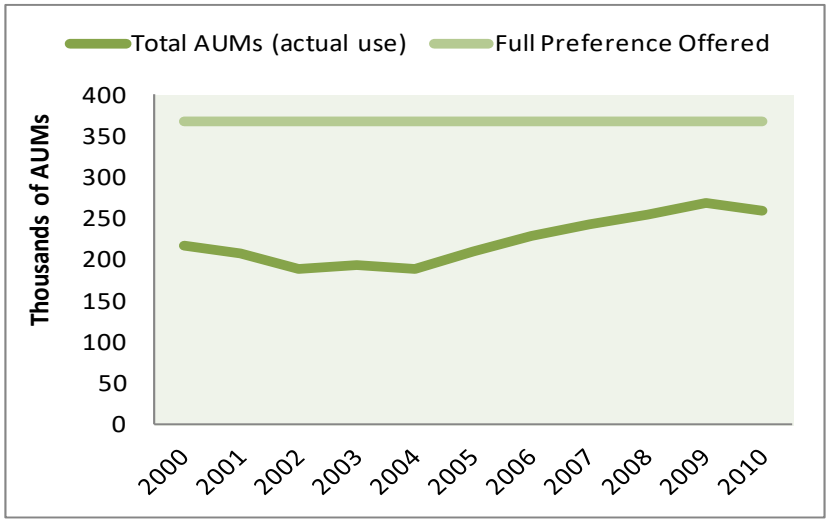

Figure 3-1. Animal Unit Months, 2000–2010 (Source: BLM 2011)

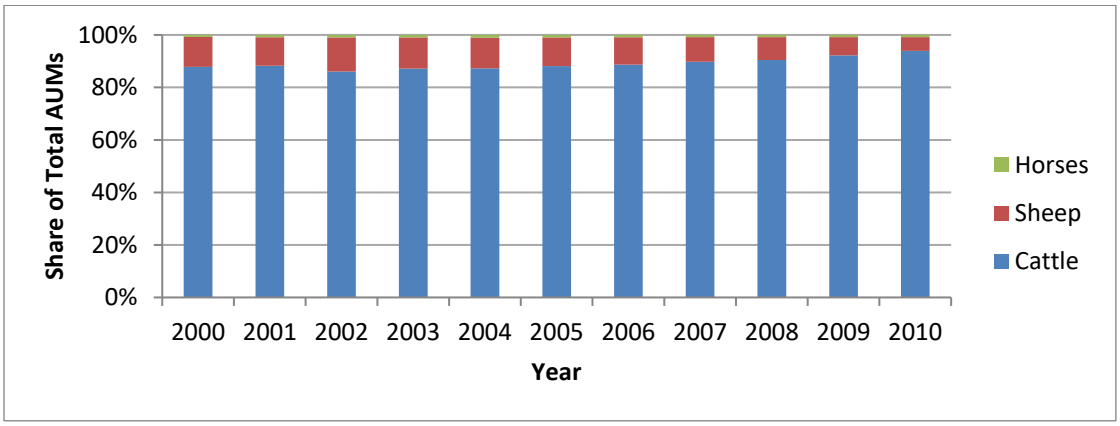

Figure 3-2. Distribution of Animal Unit Months by Livestock Type, 2000–2010 (Source: BLM 2011)

According to the most recent Census of Agriculture, there were approximately 311,000 cattle and calves in the SESA in 2007, 58% of which were located Chaves County. The same year, 159,000 cattle and calves were sold in the SESA, for a total market value of about $96 million. The market value of dairy products in the SESA was $348 million (Census of Agriculture 2007).

3.5.2.8.2 Recreation and Tourism

BLM-administered lands within the SESA offer many types of recreation opportunities. The diverse Chihuahuan Desert landscape attracts hikers, mountain bikers, equestrians, hunters, rock hounds, and a growing population of geocachers. Large sand dune areas are popular among recreationists and are primarily found on BLM-administered lands within the SESA. Wide open spaces, solitude, natural landscapes, Rockhounding, trophy mule deer, elk, pronghorn, and Barbary sheep (*Ammotragus lervia*) attract many visitors. BLM-administered areas along the Pecos, Black, and Delaware Rivers also provide for public access to riparian areas not commonly found in southeast New Mexico and the Chihuahuan Desert. Parks Ranch Cave is the second longest gypsum cave in the United States and attracts many cavers and researchers. Additional caves in the CFO planning area provide diverse recreational and research opportunities. Equestrian groups are also active on CFO-managed lands and have expressed interest in cross-country equestrian route designations, amenities, and the future possibility endurance ride events that would attract participants nationwide. According to the CFO, BLM-administered lands

provide excellent opportunity for OHV use. The Desert 100 Race, an annual 2-day motocross event held in the CFO planning area at the Hackberry Lake OHV area, typically attracts 80 to 200 riders of all ages and levels of expertise.

BLM-administered lands are also widely used for hunting a number of different bird and mammal game species, including deer, Barbary sheep, elk, antelope, javelina, quail, pheasant, waterfowl (ducks, geese, cranes), dove, and mountain lion. The NMDGF establishes and regulates all hunting-related criteria, including the sale of hunting licenses. All or part of Game Management Units 30, 31, 32, 33, and 34 are included within the CFO planning area. According to the CFO, conflicts with other public land uses sometimes arise.

Recreation visits to CFO-managed lands averaged 99,393 annually between 2007 and 2011. Approximately 80% of all visits in 2011 were classified by BLM as "dispersed use," meaning that they could not be attributed to specific sites or recreation areas. Dispersed use may include a variety of recreation activities such as camping, hiking, OHV use and other activities. Of the remaining 20% of visits that were made to specific sites, the most popular sites were Black River (a water access site) and the Hackberry Lake OHV area.

Spending estimates for visitors to BLM-administered lands were unavailable for the CFO planning area. However, the average visitor to nearby Lincoln National Forest spends approximately $55 per trip (USFS 2009). This includes both local and non-local visitors. If this spending profile is applied to BLM visits for the CFO, visitor spending averaged $5.4 million annually between 2007 and 2011. For comparison, Carlsbad Caverns National Park averaged 412,487 visits and $21 million in visitor spending from 2006 to 2009 (Stynes 2010).

Overall, the BLM estimated that recreation-related expenditures of visitors to New Mexico BLM-administered lands supported approximately 1,372 direct jobs and 1,953 total jobs statewide in Fiscal Year 2010 (USDI 2011). In Fiscal Year 2010, the CFO accounted for approximately 4.7% of the visits to New Mexico BLM-administered lands.

3.5.2.8.3 Minerals

Potash is the primary mineral mined in the CFO planning area, although both caliche and sodium are also actively mined on CFO lands. Both potash and sodium are leasable minerals and current operations—primarily potash—lease 143,832 acres of CFO lands. BLM collects royalties on production from these operations, which are shared equally with the State of New Mexico.

Caliche is considered a salable mineral and permitted operators pay by volume extracted. Total caliche sales for the CFO planning area were $6.3 million in Fiscal Year 2011 (BLM 2011).

United Salt, the only sodium operation in the CFO planning area, mines sodium from potash mine tailings, to produce animal feed, road salt, etc. Sodium mining employs approximately 75 full-time workers and produced approximately 380,000 short tons of sodium in 2010 (BLM 2011).

Potash is the common name for various mined potassium compounds and potassium-bearing materials. Sylvite and langbeinite are the two forms of potash mined within the CFO planning area. There are currently three active potash mines operating on of CFO lands. These current potash operations employ 1,194 full-time employees and 69 other employees. Table S.34 in Appendix S displays the annual production of both sylvite and langbeinite within the CFO (BLM 2011).

In addition to the three active potash mines, two recent potash operations have been decided on. The first, known as the HB In-Situ Solution Mine Project, proposes to construct and operate an in-situ solution mine in the abandoned HB Potash Mine. The HB In-Situ Project Record of Decision was signed on March 19, 2012. BLM selected the preferred alternative. The second recent potash operation was proposed by IC Potash, who has leased 76,061 acres for the project. The Ochoa Mine EIS Record of Decision was signed on April 10, 2104.

3.5.2.8.4 Oil and Gas

There is a long history of oil and gas development in the region, and much of this development occurs on CFO lands. As of October 24, 2011, there were 15,885 active oil and gas wells on the 2 million acres of CFO lands leased for oil and gas in the CFO planning area. Table 3-44 displays extraction and well detail for the CFO planning area from 2006 to 2010.

Table 3-44. Oil and Gas Activity, 2006–2010

Site	Units	2006	2007	2008	2009	2010
Oil and Gas Extraction						
Natural gas	Bcf	268.3	247.9	228.3	216.1	213.2
Crude oil	Million barrels	30.4	30.5	30.6	33.1	36.1
Oil and gas wells–drilled	Number	477	389	450	391	494

Source: BLM 2011.

Between 2006 and 2010, there was a slight decline in natural gas extraction but a slight increase in crude oil extraction. Overall the industry has remained fairly stable over the past 5 years.

In 2009, the 33 million barrels of oil extracted from CFO lands represented 57% of the SESA total and 54% of the state total. Natural gas extracted from CFO lands was 48% of the SESA total and 15% of the state total. In 2009, 1,234 oil and gas wells were drilled in New Mexico—32% were on CFO land.

3.5.2.8.5 Non-market Values

Public lands commonly generate non-market economic value. Relatively undeveloped public lands, such as those found within portions of the lands managed by the CFO, provide a range of non-market economic benefits, such as preservation of drinking water, carbon sequestration and wildlife habitat. Non-market values generally cannot be measured by traditional economic metrics, but values can be derived from secondary indicators. Amenity values are a subcategory of non-market values that can include both the value that nearby property owners derive from proximity to relatively undeveloped public lands, or the values that a more broadly dispersed population may place on these lands (existence, option and bequest values). Sometimes these values are expressed as a “willingness to pay” or “contingent value”.

Recently, there has been greater effort to identify and quantify the value of the ecological, or ecosystem, resources provided by public lands. Forest, shrub lands, wetlands and other undeveloped lands provide a host of ecological services, including carbon sequestration, water filtering and purification, erosion control, and habitat for a diversity of species. While there is a growing body of literature on this topic, and rough value estimates have been developed for some of these services, there are no available quantitative estimates of the non-market values provided by the lands managed by the CFO.

3.5.2.9 Renewable Energy

Currently, no land managed by the CFO is leased for alternative energy development. Two proposals were submitted to the CFO for meteorological site testing and monitoring requests. Authorizations were granted for both proposals to erect meteorological towers and identified lands that would be tested for their feasibility for wind energy development. These authorizations give no rights to future development of a commercial wind farm; however, they do preclude other applicants from receiving a testing authorization for the same area. These types of authorizations are only granted for a period of 3 years, after which the company must propose a development project or remove the meteorological towers and reclaim any disturbances associated with their use.

3.5.2.10 BLM Expenditures and Employment

The direct operations and employment of the CFO also provide an economic contribution to the SESA. Non-salary-related expenditures, which include BLM program-related work such as ecosystem management, supplies/materials, travel, utilities, contracts, etc., averaged approximately $4.6 million annually from 2006 to 2010 (Table S.35, Appendix S). The CFO employed an average of 113 full-time and 29 other than permanent employees per year, with a salary expenditure of $8 million per year from 2006 to 2011 (Table S.37, Appendix S).

3.5.2.11 Fiscal Conditions

The state of New Mexico, as well the counties and cities within the SESA, raises revenues from a variety of different sources. At the state level, income taxes and gross receipts tax (GRT) are the largest sources of revenue. New Mexico's GRT is broader in scope than most state's transaction taxes and includes many inter-business transactions and sales to governments (New Mexico Taxation and Revenue Department 2011). At the local government level, GRT and property taxes are typically the largest sources of revenue for cities and counties. Since oil and gas development has the potential to be impacted by CFO planning decisions, oil and gas related taxes are also considered in this analysis. The historical tax revenues described in this section are as reported by official sources and are in nominal dollars (not updated for inflation to 2011 dollars).

3.5.2.12 State of New Mexico Revenues

The major components of general fund revenue in New Mexico include GRT, income taxes (both corporate and personal), and natural resource extraction revenues, which include severance taxes, rents, and royalties. Table S.36 in Appendix S shows these revenue sources from 2007 to 2010.

Fiscal effects of the recession can be seen in the decreasing revenue from each of these major components in 2009 and 2010. Total general fund revenue also fell in 2009 and 2010. GRT is the largest revenue source for the state and accounts for an average of 31% of total general fund revenue for the years shown.

Severance taxes, rents, and royalties include revenue from all natural resource extraction, but these figures are dominated by oil and gas related contributions. The full effect of oil and gas industry operations on the general fund goes beyond these categories and includes production taxes, royalties, bonuses, taxes on direct activities, and taxes on indirect activities. Incorporating all these sources, the New Mexico Taxation and Revenue Department estimated state general fund revenue from oil and gas operations to be approximately $1.275 billion or 27% of the general fund in Fiscal Year 2010. The department also estimated the total state and local revenue from oil and gas operations to be $2.2 billion when including other state funds (Severance Tax Bonding Fund and Land Grant Permanent Fund) and local government revenues (Clifford 2011).

3.5.2.13 Local Government Revenues

GRT is also a major component of local government revenue. Table S.38 in Appendix S depicts annual GRT distributions to the counties and communities within the SESA. The amount shown for the counties reflects the county government's share of GRT, not the total amount distributed to entities within the county.

For most SESA communities, GRT revenue increased between 2007 and 2008. However, in 2009 all SESA communities experienced a decrease or slowed growth in revenue, reflecting the fiscal effects of the recession.

Property taxes are another substantial source of revenue for the counties and municipalities in the SESA. Property tax obligations (revenue assuming 100% collection) are shown in Table S.39 in Appendix S.

The total property tax obligation in Lea County is the highest of the SESA—over 250% higher than the tax obligation in Chaves County. Obligations in Lea County also increased faster than the rest of the SESA with annual growth at 30% from 2008 to 2009.

The counties in the SESA contain a substantial amount of federal land, which is exempt from property taxes. In order to offset such losses in property taxes, local governments receive federal payments based on the amount of nontaxable federal lands within their boundaries. These payments in lieu of taxes (PILT) are shown in Table S.40 in Appendix S for the SESA counties and New Mexico as a whole.

Eddy and Chaves Counties received the highest PILT in New Mexico in 2010. The SESA as a whole received $7 million in 2010, which was 22% of the total PILT to the state.

3.5.2.14 Economic Development Strategies

This section briefly reviews the economic development strategies in the SESA to provide additional context for the CFO planning area. As discussed previously, the historic economic base for the SESA—especially in Eddy and Lea Counties—has been centered on extractive industries, such as oil and gas, potash, etc. In order to mitigate the risk of boom and bust cycles associated with these industries, the counties and communities within the SESA continue to highlight economic diversification in their development goals.

Eddy County's 2008 Comprehensive Plan acknowledges making strides in diversifying the local economy from traditional sectors to new sectors, in part due to the location of the Federal Law Enforcement Training Center and the Waste Isolation Pilot Plant in the county. Even so, the plan sets goals to address persistent economic challenges such as small business development, distribution of tourism dollars (concentrated near Carlsbad Caverns), quality job creation, workforce shortages/mismatches, and maintaining agricultural viability (Eddy County 2008).

Lea County, historically subject to boom and bust cycles in the fossil fuels industries, actively recruits new business to the area through the Economic Development Corporation of Lea County. The City of Hobbs identified the metal fabrication, energy, and food processing industries as targets for economic development and job growth in 2013 (New Mexico Economic Development Department [NMEDD] 2011).

Chaves County included the following economic goals in its 2004 Comprehensive Plan: promote the Roswell Industrial Air Center to strengthen existing business, attract new business development and encourage development of complementary industrial centers, promote foreign trade with Mexico, ensure that county permitting processes enhance economic development opportunities, and build workforce skills to help retain and attract business (Chaves County 2004). The City of Roswell identified aircraft manufacturing and services, homeland security, and renewable energy as target industries for job creation (NMEDD 2011).

3.5.2.15 Potential Environmental Justice Communities

Environmental Justice involves the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and Tribal programs and policies.

Executive Order 12898, issued in 1994, requires that ". . . each Federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

BLM's Environmental Justice Principles, described in Appendix D (Social Science Considerations in Land Use Planning Decisions) of the BLM Planning Handbook, state that the BLM will determine if its proposed actions will adversely and disproportionally impact minority populations, low-income communities, and Tribes (reference Executive Order No. 12898, Environmental Justice), and consider aggregate, cumulative, and synergistic effects, including results of actions taken by other parties.

Evaluation of environmental justice impacts requires identification of minority and low-income populations (including Native American tribes) within the SESA and evaluation of the potential for the alternatives to have disproportionately high and adverse impacts on such populations.

3.5.2.15.1 Terminology

A number of important terms are used in the evaluation of potential environmental justice issues. While there is some room for interpretation, the guidance on environmental justice terminology developed by the President's CEQ (1997) is discussed below.

- Low-income Population. A low-income population is determined based on annual statistical poverty thresholds developed by the U.S. Census Bureau. A low-income community may include either a group of individuals living in geographic proximity to one another or dispersed individuals (such as migrant workers or Native Americans) where the group experiences a common effect or environmental exposure.
- Minority. Minorities are individuals who are members of the following population groups: American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic.
- Minority Population Area. An area is defined as a minority population area if either the aggregate population of all minority groups combined exceeds 50% of the total population in the area or the percentage of the population in the area comprising all minority groups is meaningfully greater than the minority population percentage in the broader region. Like a low-income population, a minority population may include either individuals living in geographic proximity to one another or dispersed individuals experiencing a common effect or exposure.
- Disproportionately High and Adverse Environmental Effects. A disproportionate adverse effect is an impact on the natural or physical environment that significantly and adversely affects a minority or low-income population to a greater degree than the general population as a whole. Effects may include ecological, cultural, human health, economic, or social impacts interrelated to the impact on the natural or physical environment. A disproportionate impact on such populations is one that appreciably exceeds the impact on the general population or other appropriate comparison group (CEQ 1997).
- Comparison Population. For the purpose of identifying a minority population or a low-income population concentration, the comparison population used in this study is the state of New Mexico as a whole.

3.5.2.16 Populations of Interest

The following sections focus on the initial objective of the environmental justice evaluation—identifying populations of potential concern in terms of environmental justice issues. An evaluation of the potential for the alternatives to have a disproportionate adverse effect on these populations is provided in the Environmental Justice Impacts Analysis in Chapter 4.

3.5.2.16.1 Low-income Population

The most recent income and poverty data for the communities within the SESA is the 2005–2009 American Community Survey 5-year estimates. Using this data set, Figure 3-3 depicts the proportion of the population living below the poverty level in the counties and communities located in the SESA. For comparison, the figure also includes the United States, New Mexico, and the SESA as a whole.

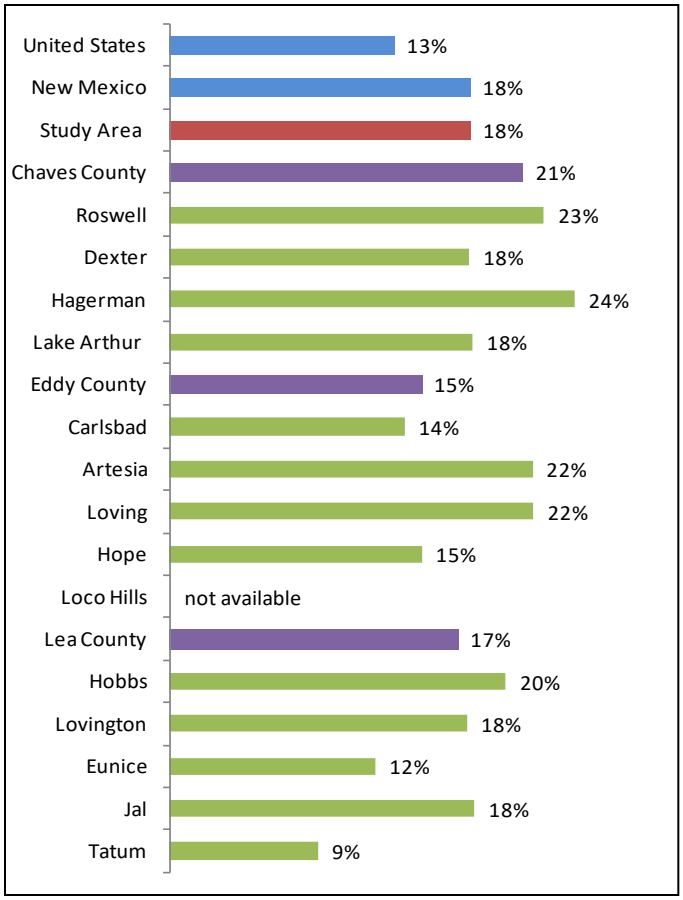

Figure 3-3. Proportion of the Population Living Below the Poverty Level, 2005–2009
(Source: U.S. Census Bureau 2009a, 2009b)

The percent of the population living below the poverty level in the SESA as a whole is representative of the state—both at 18%—but is higher than the national average of 13%. Nearly one-quarter of the residents in Hagerman (in Chaves County) are living in poverty. Roswell, also located in Chaves County, has the second highest incidence of poverty (23%), followed by Artesia (22%), and Loving (22%). The poverty rates in each of these communities exceed the state average by at least four percentage points. Relative to the state of New Mexico, Hagerman, Roswell, Artesia, and Loving could be considered low-income communities.

The municipalities with the lowest proportions of the population living in poverty were Tatum (9%) and Eunice (12%). At the county level, Eddy County (15%) had the lowest proportion of residents living in poverty and Chaves County (21%) had the highest.

3.5.2.16.2 Minority Population

In 2010, minorities made up 60% of the population in the state of New Mexico compared to 36% in the United States as a whole (see Figures S.7 and S.8 in Appendix S). While the proportion of minorities in the SESA (54%) substantially exceeded the United States, it was below the state average. At the county level, the population ranged from 48% minority in Eddy County to 57% in Lea County.

Based on the definition of a minority population area (minority residents exceed 50% of all residents), Roswell, Dexter, Hagerman, Lake Arthur, Artesia, Loving, Hobbs, Lovington, and Jal are all considered minority communities. The highest concentrations of minority populations are in Loving (80%), Dexter (78%), and Lake Arthur (74%)—all at least 20 percentage points higher than the SESA average.

As demonstrated by Figure 3-3, the minority population within the SESA in 2010 was driven by the Hispanic community. Hispanics made up 49% of the total population in the SESA and 91% of the minority population.

3.5.2.17 Summary of Existing Economic Conditions

In general, this area is relatively affluent for a rural part of the state. Statewide income and wage averages are usually dominated by the major population centers (Albuquerque and Santa Fe in New Mexico), where wages and earnings are higher. However, this region generally compares favorably to the statewide averages, with the median household income in two of the three SESA counties exceeding the statewide median.

The SESA economy is dominated greatly by resource extraction. The percentage of jobs in the mining sector is very high (ranging from 7.1% in Chaves County to 21.6% in Lea County), and—bearing in mind the relatively high multipliers associated with these types of jobs—the proportion of the economy supported by extractive industries is substantial. This type of situation is often associated with high wages (and strong fiscal conditions) but can sometimes result in a region also being quite vulnerable to "booms and busts."

Of the activities occurring on CFO lands, cattle grazing and resource extraction have the most significant economic impact on the SESA. However, recreational opportunities—specifically hunting and OHV use—also provide important socioeconomic benefits for the SESA.

The SESA as a whole has a high percentage of minorities, most of whom are Hispanic. The communities of Roswell, Dexter, Hagerman, Lake Arthur, Artesia, Loving, Hobbs, Lovington, and Jal all have minority populations over 50% and are thus considered "minority population areas" under environmental justice standards. Other potential environmental justice populations, determined by low-income status, are Hagerman, Roswell, Artesia, and Loving.

3.5.3 Health and Safety

The BLM's mission is to sustain public lands for the use and enjoyment of present and future generations and FLPMA requires that BLM actions comply with approved standards for public health and safety. The BLM issued Manual 1703 – Hazard Management and Resource Restoration (HMRR) in 2009, which describes the objectives and responsibilities of the program (BLM 2009). The goals of managing for public safety are to 1) protect public health and safety and environmental resources by minimizing environmental contamination from past and present land uses on public lands and on BLM owned and operated facilities; 2) comply with federal, state, and local hazardous materials management laws and regulations; 3) maintain the health of ecosystems through assessment, clean-up, and restoration of contaminated lands; 4) manage the costs, risks, and liabilities associated with production of hazardous materials by operators to protect the government from bearing the financial burden of liabilities; and 5) integrate environmental protection and compliance with all environmental statutes into BLM actions.

The project area, although historically used for agriculture and grazing, has, in recent decades, seen increasing oil and gas development. Development, and an increased human presence, increases the likelihood of health and safety issues including traffic accidents, wildlife collisions, hazardous substances, and work-related accidents. Health and safety issues can result from both natural and human-made circumstances. Natural environmental circumstances may include venomous or aggressive wildlife or domestic livestock, extreme weather, flooding, wildfire and debris flows. Human-made hazards may include the presence of hazardous materials and wastes, recreational activities such as hunting and target shooting, or the presence of active or abandoned mines.

3.5.3.1 Motorized Vehicle Use

Safety issues relating to motorized vehicle use for recreational or commercial purposes are prevalent on public lands. Access to motorized vehicles is provided via existing federal, state, or county transportation routes. Safety issues associated with vehicular access may have implications for the management of public lands, particularly considerations for the variety of users. Motorized vehicle operations consist of two- and four-wheel-drive vehicles, large and small commercial vehicles used for mineral resource extraction, as well as an assortment of OHVs used for recreation, hunting, sightseeing, wildlife viewing, and lawful harvest of natural resources.

3.5.3.1.1 Off-highway Vehicles

OHV travel, which includes any motor vehicle that may travel over land, is allowed throughout the CFO planning area. There are a number of OHV designated areas throughout the CFO planning area, including the Alkali Lake OHV Area and Hackberry Lake OHV Area. OHVs are used in general recreation for the transport of recreational visitors, but they may also provide recreational activities themselves in the form of motorcycle and ATV pursuits. Given the rough terrain of the planning area and nature of ATV and motorcycle activities, these pursuits come with their own safety hazards. The most recent data from the U.S. Consumer Product Safety Commission (CPSC) reports that nationwide there were over 100,000 ATV-related injuries in 2011 and 6,946 ATV-related deaths between 2001 and 2010 (CPSC 2013). Preliminary data reports show at least nine deaths have occurred nationwide in the early part of 2013 (CPSC 2013). In NM, 94 ATV-related deaths were reported between 1982 and 2011, 31 of which were children aged 16 or younger (CPSC 2013). State legislation for New Mexico ATV ownership and usage lists the state laws pertaining to safe ATV use (http://www.atvsafety.gov/legislation/NewMexicolaw.pdf). The New Mexico State Police is the state agency responsible for ATV regulation in New Mexico.

ATV safety training, manufacturer recommendations for age and size of appropriate vehicles, and strict adherence to state laws have helped to reduce ATV-related deaths and injuries nationwide and in New Mexico. Better management regarding access to OHV users has also been used to improve safety on public lands and reduce conflicts with other activities.

Due to the growing popularity of OHV use and the increasing population pressures in the area, OHV use is expected to increase in the CFO planning area in future years. User conflicts and associated safety concerns would need to be mitigated using travel management decisions, increased OHV designated areas and signage.

3.5.3.2 Recreational Activities

Any recreational activity may have inherent safety risks to the participants or other users. Recreational activities within the CFO planning area include caving, horseback riding, biking, hiking, rock climbing, camping, and ATV use. Recreational users can usually follow activity specific recommendations to reduce hazards such as the use of appropriate gear and clothing and following standard safety practices to prevent or reduce injury.

3.5.3.2.1 Shooting and Hunting

The use of firearms including recreational shooting and hunting carries inherent risk to participants and non-participants. In addition, littering, illegal dumping, damage to natural resources (trees used as targets) and property (signs and structures) have all been associated with recreational shooting on public lands. Recreational shooting is permitted in dispersed, informal locations throughout the planning area but is prohibited from all recreational areas. Recreational shooting is, however, not officially sanctioned by the CFO and must be carried out in accordance with state and federal law. Legitimate shooting as part of lawful hunting activities is allowed except within 0.5 mile of developed recreational sites or areas.

Conflicts between hunters and target shooters and other users also raises safety concerns, particularly in heavily recreated areas or areas close to recreational facilities such as trailheads or equestrian trails. Recreational shooting in these areas directly conflicts with state and federal use and conduct laws and is regulated by BLM law enforcement personnel. Safety concerns are often related to insufficient back stops or screening, which poses hazards to other users.

Requests for shooting closures are expected to increase in high use areas with increasing conflicts between users and concerns over safety.

3.5.3.3 Minerals and Energy Development

Mineral and energy development, including oil and gas and mining, is often associated with concerns for public health and safety. The BLM requires that all mineral and energy development operators comply with regulations designed to protect the environment and the public, and with additional requirements imposed by the BLM as part of the land use lease or ROW grant.

3.5.3.3.1 Oil and Gas Exploration

Hazardous chemicals are used and produced by oil and gas developers as part of the extraction process, and any accidental spills can contaminate surface water, groundwater, and soil. Active wells can produce hazardous chemical emissions as a result of failure to control valves, leaking equipment, water or condensate tanks, and gas compressors.

Oil and gas exploration in the CFO planning area is increasing and with this increase it is expected that concerns for public health and safety relating to oil and gas exploration would become more prevalent.

3.5.3.3.2 Hydrogen Sulfide Wells

H_2S is a poisonous gas that can occur in association with oil and gas operations, and is an extremely hazardous, toxic compound. It is colorless, flammable gas that can be identified in relatively low concentrations, by a characteristic rotten egg odor. The gas occurs naturally in coal beds, sulfur springs, gas wells, and as a product of decaying sulfur-containing organic matter, particularly under low oxygen conditions. Petroleum and natural gas refining can produce H_2S. Although perceptible at low concentrations due to its familiar odor, as concentrations of the gas increase it can lead to temporary paralysis of the olfactory nerves in the nose, leading to a loss of smell. Therefore, the gas can be present at high concentrations with no perceivable odor.

Symptoms of H_2S exposure are similar to those of CO exposure, in that the gas inhibits cellular respiration and uptake of oxygen causing biochemical suffocation. Typical exposure symptoms include:

- Low (0–10 ppm): Irritation of the eyes, nose and throat.
- Moderate (10–50 ppm): Headache, dizziness, nausea and vomiting, coughing, and difficulty breathing.
- High (50–200 ppm): Severe respiratory tract irritation, eye irritation, acute shock, convulsions, and death in severe cases.

According to the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA), the exposures must not exceed 20 ppm with the following exception: if no other measurable exposures occur during the 8-hour work shift, exposures may exceed 20 ppm, but not more than 50 ppm for a single time period up to 10 minutes (OSHA 2013; 29 CFR 1910).

3.5.3.3.3 Potash Mines

In December 2012 Secretary of the Interior Ken Salazar announced a new Secretarial Order 3324 to promote orderly and safe development of oil and gas and potash development in the Designated Potash Area in southeastern New Mexico, where large deposits of potash and oil and gas are found. Potash is a potassium-bearing mineral used primarily for fertilizer. The 2012 Secretarial Order addresses new technologies and other issues associated with oil and gas and potash leasing and development. The purpose of the Secretarial Order is to promote efficient development of the resources while minimizing conflicts between the industries and ensuring safe operations.

3.5.3.4 Hazardous Materials

Federal and state law and policies regulate the generation, use, storage, and disposal of hazardous and extremely hazardous substances. Hazardous materials can be defined as any item or chemical that has the potential to cause harm to humans, natural resources of the environment when spilled, released or contacted. The EPA classifies hazardous materials as toxic, corrosive, ignitable, or reactive, and some materials may exhibit multiple characteristics. Substances considered hazardous are listed in 40 CFR 302, Designation, Reportable Quantities, and Notification, and are administered under Title III of the Superfund Amendments and Reauthorization Act (1986) of the Comprehensive Environmental Response, Compensation, and Liability Act. Hazardous substances may also be listed within Section 112 (r) of the Clean Air Act (1990). Extremely hazardous materials are those identified in the EPA's List of Extremely Hazardous Substances (40 CFR 355) titled as the Emergency Planning and Notification, which establishes a list of extremely hazardous substances and states the threshold planning quantities and the facilities notification responsibilities necessary for the development and implementation of state and local emergency response plans required under the Emergency Planning and Community Right-to-Know Act. An abbreviated hazardous and extremely hazardous substance list has been produced and is available from the EPA (2001).

The EPA regulates the planning, response, and reporting procedures necessary when handling, storing, or disposing of hazardous substances. The regulations are included within the Code of Federal Protection of the Environment Regulations (EPA 40 CFR 302 and 355). The 1990 CAA Amendments require that facilities using extremely hazardous substances in excess of specified threshold quantities prepare a Risk Management Plan. In New Mexico, the NMED Hazardous Waste Bureau (2013) provides regulatory oversight and technical guidance to New Mexico hazardous waste generators and treatment, storage and disposal facilities as required by the New Mexico Hazardous Waste Act [Chapter 74, Article 4 New Mexico Statutes Annotated 1978] and regulations promulgated under the act.

The use, storage, and transport of hazardous wastes on BLM-administered lands by authorized personnel may lead to accidental releases. Hazardous materials may originate from pesticide applications, construction activities, mining activities, concessionaire operations, commercial transportation, and oil and gas operations.

The frequency of hazardous material incidents tends to increase with economic activity, population growth, and development of industry and mineral extraction in the area.

3.5.3.4.1 Illegal Dumping

Illegal dumping is defined as the disposal of waste in an unpermitted area (EPA 1998). Illegally dumped wastes are primarily non-hazardous materials such as construction and demolition wastes, household appliances, furniture, household trash, scrap tires, auto parts, and vehicles. If not addressed immediately, dump sites often grow in size and may attract more harmful wastes such as medical waste, chemicals, and industrial waste (EPA 1998). The entire CFO planning area is prone to illegal dumping; however, problem areas exist at the La Cueva Trail Area and portions of the Pecos River, Karr Ranch Road, and Hackberry OHV Area. Remote public roads and recreation area parking lots are often subject to illegal dumping due to minimal law enforcement presence. Areas of high potential mineral development are also targeted. Illegal dumping increases as access roads continue to be developed and as the local population grows and the cost of legal disposal in landfills increases.

3.5.3.5 Physical Hazards

Exposure to physical hazards such as abandoned mines, wildfire, flooding, rough terrain, and livestock or other animals is an inherent risk when conducting any activity in the CFO planning area. Areas far removed from infrastructure and services would always pose risk to unprepared visitors. Adequate planning and the use of proper equipment and apparel should be exercised whenever conducting activities in remote areas.

3.5.3.5.1 Presence of Abandoned Mines

The BLM's Abandoned Mine Lands (AML) program seeks to reduce or eliminate the effects of past hard rock mining in order to enhance public safety and improve water quality. The BLM maintains an inventory of abandoned mines on public lands in order to identify needed reclamation and remediation actions. The BLM adheres to OSHA and Mine Safety and Health Administration safety standards for active mines for all safety related to mining activities on CFO lands (Mine Safety and Health Administration 2013).

The BLM teams with cooperative conservation partners to mitigate public safety hazards from abandoned mining and within the BLM the AML program coordinates with the Hazardous Materials program in order to ensure any hazardous materials associated with abandoned mines are remediated. There are a number of active and abandoned mines within the CFO planning area that due to increased OHV use and rising population growth may become accessible to recreational users and visitors.

Abandoned mines may pose hazards to visitors due to open mine shafts (vertical openings) that may be obstructed or obscured and unstable openings or tunnels, which may collapse. Dilapidated and unstable buildings may also be associated with abandoned mines and subject to collapse and mining implements and construction debris could also be hazardous.

In addition, abandoned mine operations may facilitate illegal dumping of hazardous wastes, or in active mine operations, hazardous explosives or chemicals used in milling or drilling operations may be present. Active mine tailings may also leach chemicals into the soil or groundwater, contaminating watersheds, or may produce airborne hazardous wastes.

3.5.3.5.2 Wildfires

Wildfires are potentially dangerous to life and property. The severity of the risk varies with the topography, terrain, vegetation, and climate of the area but remote areas with poor accessibility would be especially dangerous to visitors as they may become entrapped. Visitors should be aware of the current fire risk and have an evacuation plan in the event they were to become involved in a wildfire. Visitors should also practice fire prevention awareness, stay on marked roads, adhere to fire and smoking bans, and limit the potential for fire spread from vehicle contact or machinery.

3.5.3.5.3 Livestock Grazing Operations

Livestock grazing operations may pose a minimal risk to visitors on public lands. Potential hazards include livestock vehicle collisions, encounters with aggressive livestock, and accidents while navigating in around livestock enclosures, fences, or wells.

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4.1 INTRODUCTION

This chapter presents the environmental consequences of the management actions proposed under the five alternatives described in Chapter 2. These management actions were developed to look at a full range of reasonable options in the management of public lands within the current Carlsbad planning area, including management and allocation of public land resources, their uses, and protection. Bureau of Land Management (BLM) decisions about resource use and management in the planning area will be based on this analysis.

Five alternatives are analyzed. The No Action Alternative would be a continuation of existing management practices defined in the Carlsbad Resource Management Plan (RMP) as amended (BLM 1988). The 1988 RMP was amended in 1997 and in 2008 (see Chapter 1 for more information on the amendments). Alternative A would offer more protection to watershed health and emphasize restoration. Alternative B would focus on maintaining the existing nature of undeveloped areas and concentrating development in areas where development is already substantial. Alternative C would rely on management restrictions and/or direction to address resource conflicts rather than geographic separation of uses. Alternative D would manage resources and resource uses within the mandates of existing laws and regulations without additional restrictions. See Chapter 2 for more details on the alternative themes.

This RMP/Environmental Impact Statement (EIS) provides a landscape-scale "big picture" level of analysis, and in most cases the exact locations of projected development and other changes are not known at this time. The analysis in this chapter is an impact analysis of the alternative management actions and prescriptions as they would impact the affected environment. Impacts are defined as modifications to the existing environment brought about by implementing an alternative. For the analysis, BLM staff used existing data, science, current methodologies, professional judgments, and projected actions and levels of use. The analysis takes into account the stipulations described in Chapter 2.

4.1.1 Chapter Organization

Chapter 4 details the environmental consequences of program decisions on each listed resource or resource use. Resources and resource uses are presented in the same general order as the *BLM Land Use Planning Handbook*'s outline for EISs. The environmental consequences of the decisions imposed by other programs on that resource are delineated for each of the five alternatives. For example, the impacts of recreation decisions on riparian resources are listed by the decisions imposed by recreation under each of the five alternatives.

4.1.2 Analysis Methods

Impact analyses and conclusions are based on interdisciplinary team knowledge of the resources, resource uses, and the planning area, information provided by BLM experts or experts from other agencies, and information in pertinent existing literature. The analysis takes into account the Conditions of Approval (COAs) and best management practices (BMPs) described in Appendix O and stipulations described in Appendix C. Spatial analysis was performed using Environmental Systems Research Institute, Inc. (ESRI) ArcGIS computer software.

4.1.2.1 Analysis Assumptions

Mineral development potential was assessed in the Reasonably Foreseeable Development (RFD) Scenario prepared for the Carlsbad Field Office (CFO). The RFD scenario prepared for the RMP identified high development potential areas for oil and gas (leasable mineral resources) within the CFO planning area.

To assess the potential for effects from oil and gas development, it was assumed that the average surface disturbance per existing well was representative of future well sites. In the RFD, past development, industry trends, and mineral data information were used to predict future development. The total number of existing oil and gas wells and their associated roads and pipelines was used to calculate the projected, approximate

surface disturbance per well: 2.0 acres per vertical well and 1.75 acres per horizontal well. The 0.25 acreage difference captures the difference in surface impacts for vertical and horizontal wells. Typically, there is less surface disturbance for horizontal wells because more wells can be clustered onto a single pad. Sub-surface impacts would depend on many factors including the depth of drilling, length of the horizontal bore, etc.

The RFD scenario is a 20- year glance into Oil and Gas Development potential. Based on the water usage in the RFD scenario (32,769 AF), water usage per year is expected to increase by 1638.5 AF. This is 0.25 percent of the total water usage for PDO in 2010 (Longworth, Valdez, Magnuson, & Richard, 2013). Since the percentage of water use for the RMP is such a small portion of the overall usage in the PDO, BLM does not expect RMP to have a significant impact on ground and surface water resources.

It is not possible to know the impacts to any particular aquifer because the water is sourced for each individual project from different locations, even outside the state, and that to the extent feasible, the BLM will undertake that analysis at the individual project at the APD stage when the BLM will know better the source and impacts of the water used for that project.

Predicted surface disturbance for oil and gas development by alternative on BLM surface and split estate lands were calculated by multiplying the percentage of BLM lands open for development under each of the alternatives and by the total number of wells predicted for all lands. The resultant number of wells was multiplied by surface disturbance assumptions per well (see Table 4-1) to arrive at total predicted surface disturbance. Note that there is no way to accurately predict surface disturbance on split estate lands because the surface is owned by private parties. However, to disclose potential impacts, the same methodology used for surface impacts are also applied to split estate lands where appropriate. The CFO estimates that approximately 25% of the surface disturbance on BLM-administered lands within the planning area would be reclaimed during the life of the plan. Surface disturbance acres disclosed in this chapter include the 25% reclamation factor. Finally, 7.3 acre-feet of water use per horizontal well and 1.53 acre-feet of water use per vertical well is expected for construction and development of a single well. This assumption is based on an average current use of water per well in the CFO planning area. The RFD well totals were developed for the purposes of assessing impacts for decision-making. The total number of wells permitted would be determined through site-specific National Environmental Policy Act (NEPA) analysis of field development projects.

BLM administers surface and subsurface (split estate) lands. The calculations developed for resource impacts may apply to surface and/or subsurface lands depending on the resource. For the purposes of this analysis, both surface and subsurface acreages were used for all resources and resource uses except for 1) livestock grazing, travel, solar, wind, land tenure, and land use authorizations; 2) rights-of-way where only surface lands were calculated; and 3) geothermal where only subsurface lands were included.

Note that for all calculations, the total acreage between all alternatives can vary up to 250 acres due to the intersect in geographic information system (GIS) shapefiles that creates slivers when two or more layers are intersected.

Table 4-1. Summary of Predicted Wells and Surface Disturbance for Oil and Gas Activity on BLM Surface Lands

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions (acres)	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Open with moderate constraints (controlled surface use) (acres)	956,410	799,649	449,759	786,381	631,634
Open with major constraints (no surface occupancy) (acres)	54,602	80,394	162,013	158,401	70,142
Closed (acres)	174,391	761,404	1,082,972	88,502	84,687
Total (acres)	2,784,273	2,784,248	2,784,224	2,784,058	2,784,145
Total acres open to surface disturbance (open with standard stipulations and moderate constraints)	**2,555,280**	**1,942,451**	**1,539,240**	**2,537,155**	**2,629,315**
Percentage of total area open to surface disturbance (open with standard stipulations and moderate constraints)	**92%**	**70%**	**55%**	**91%**	**94%**
Number of RFD predicted wells	**6,400**	**6,400**	**6,400**	**6,400**	**6,400**
Number of predicted wells based on percentage of land open to surface disturbance	**5,874**	**4,465**	**3,538**	**5,832**	**6,044**
Number of predicted vertical wells, BLM (vertical wells = 12.0%)	**705**	**536**	**425**	**700**	**725**
Number of predicted horizontal wells, BLM (horizontal wells = 88.0%)	**5,169**	**3,929**	**3,114**	**5,133**	**5,319**
Predicted surface disturbance from vertical wells (1.67 acres per vertical well) (acres)	**1,177**	**895**	**709**	**1,169**	**1,211**
Predicted surface disturbance from horizontal wells (2.0 acres per horizontal well) (acres)	**10,338**	**7,858**	**6,227**	**10,265**	**10,638**
Total predicted surface disturbance/acres (acres)	**11,515**	**8,753**	**6,936**	**11,434**	**11,849**
Reclamation factor (percentage of area reclaimed during the life of the plan)	0.25%	0.25%	0.25%	0.25%	0.25%
Amount of reduction in surface disturbance (acres)	2,879	2,188	1,734	2,858	2,962
Predicted surface disturbance after reclamation (acres)	**8,636**	**6,565**	**5,202**	**8,575**	**8,887**

4.1.3 Types of Impacts

4.1.3.1 Impact Terminology

Direct impacts are attributable to implementation of an alternative that affects a specific resource, and generally occur at the same time and place. Indirect impacts can result from one resource affecting another (e.g., soil erosion and sedimentation affecting water quality) or can occur later in time or removed in location, but are still reasonably foreseeable. Long-term impacts are those that would substantially remain for many years or for the life of the project. Temporary impacts are short-term or ephemeral changes to the environment, which would return to the original condition once the activity stopped, such as air pollutant emissions caused by earthmoving equipment during construction. Short-term impacts result in changes to the environment that are stabilized or mitigated rapidly and without long-term impacts. Cumulative impacts could also occur as the result of past, present, and reasonably foreseeable future actions by federal, state, and local governments; private individuals; and entities in or near the CFO planning area. Cumulative impacts could result from individually minor but collectively significant actions that take place over time.

Management Common to All Alternatives refers to decisions and impacts that apply to all the alternatives; the No Action Alternative and Alternatives A through D. Management Common to All Action Alternatives refers to decisions and impacts that apply to Alternatives A through D.

4.1.4 Incomplete or Unavailable Information

This analysis was done using the best-available information believed to be sufficient for a programmatic analysis of the impacts of multidiscipline decisions on management direction on a planning area–wide basis. This includes but is not limited to landscape-level data such as major land resource areas (MLRAs), soils data, and field-office information on wildlife habitat boundaries. Additional site-specific data (including cultural resources surveys, threatened and endangered species surveys, etc.) will be required to complete site-specific NEPA analysis necessary prior to implementation of vegetation management activities proposed.

According to Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1502.22), for incomplete or unavailable information, the agency must provide:

1. A statement that such information is incomplete or unavailable;
2. A statement of relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
3. A summary of existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
4. The agency's evaluation of such impacts based upon theoretical approaches or resource methods generally accepted in the scientific community.

The following resources have incomplete or unavailable information; therefore, impacts analysis is limited:

- A transportation inventory is not complete for all BLM-administered lands in the planning area. Information on levels of use in the planning area is limited. To date, route inventories have been completed for lands within all proposed Areas of Critical Environmental Concern (ACECs) in the planning area. A Travel Management Plan would also be developed and implemented after approval of the revised RMP. At that time, the CFO would designate specific roads, primitive roads, and trails (routes) available for public and administrative travel, along with specific limitations on such travel. For this Draft RMP/EIS, off-highway vehicle (OHV) area designations ("open," "limited," and "closed") are listed by alternative. Within the "limited" designation, routes would be limited to existing roads, primitive roads, and trails. It is possible that field staff knowledge and/or information from the public would not encompass all areas with high demand for access. However, the field staff and the public are aware of the areas where vehicle travel is common, and where it may be presenting resource conflicts. As such, it is unlikely that having a completed transportation inventory would change the results of this impact analysis.

- The locations and extent of future renewable energy projects on BLM-administered lands are largely unknown, but are likely to occur in areas identified as high potential for wind, solar, and geothermal energy projects. Similarly, future oil and gas development in the planning area is based on the best available information, as described in the RFD scenario (Engler et al. 2012). For both renewable energy and mineral development, generalized effects are described based on typical surface-disturbing scenarios experienced by the BLM in similar developments. Knowing the precise location and size of future development projects would not likely change the reasonably foreseeable significant adverse impacts because renewable energy and mineral developments are most likely to occur where potential for the resources is high, which is how the impacts for these resources were evaluated. The resources that could be impacted by these resource developments, such as wildlife, have a sufficiently broad distribution in the planning area that moving a development from one site to another would not change the impacts significantly. Existing scientific evidence that is relevant to evaluating reasonably foreseeable impacts related to renewable energy and mineral development, and the evaluation of those impacts, is contained in Sections 4.2 through 4.5.
- A comprehensive inventory of biological resources, including rare plants, special status species, and invasive species, has not been completed for the CFO. These biological resources are known to occur in the planning area, and certain areas have been inventoried and recorded. This incomplete information is relevant to reasonably foreseeable significant effects if land use planning decisions allocated uses that would result in adverse impacts to rare plants and special status species or result in the spread or introduction of invasive species. This incomplete information is not essential for a reasoned choice among alternatives. Potential impacts to rare plants, special status species, and invasive species are similar among all action alternatives because other environmental laws and regulations would greatly reduce the potential for significant adverse effects under each alteration, and because site-specific NEPA analysis would be required prior to implementation of activities that would prescribe BMPs to address biological resource issues. Existing scientific evidence that is relevant to evaluating reasonably foreseeable impacts to vegetative communities and special status species are contained in Sections 4.2.3 and 4.2.5, respectively.
- No formal surveys of visitors regarding their preferences for recreation settings and experiences have been conducted. This information would be relevant to identify previously unknown recreation uses within the planning area and to evaluate reasonably foreseeable significant adverse impacts to those recreation uses. This information may have changed the estimated impacts of land use plan decision to particular types of recreation. However, it is unlikely that field staff would be unaware of the type and extent for demand of recreational opportunities on the lands administered by the CFO. Interaction with public inquiries, special recreation permittees, and user groups has given the CFO a reasonable understanding of the desired recreational opportunities in the planning area. Existing scientific evidence that is relevant to evaluating reasonably foreseeable impacts to recreation is contained in Section 4.3.5.
- The archeological inventory for the CFO is incomplete and existing inventories cover approximately 18% of BLM-administered lands in the planning area. This incomplete information is relevant to reasonably foreseeable significant adverse effects, given the possibility that management decisions would allocate land uses to activities that would irreversibly damage currently unknown sites, which would constitute a significant adverse effect. This incomplete information is, however, not essential for a reasoned choice among alternatives. Potential impacts to cultural resources are similar among all action alternatives because other environmental laws and regulations (Section 106 of the National Historic Preservation Act [NHPA] and Archaeological Resources Protection Act) would greatly reduce the potential for significant adverse effects under each alternative and because site-specific NEPA would be required prior to implementation of proposed activities. Incomplete information regarding the location of cultural resources is in this sense less useful to the decision maker, who is assured that no matter which alternative he or she selects, significant adverse effects to cultural resources would be avoided. Existing scientific evidence that is relevant to evaluating reasonably foreseeable impacts to cultural resources, and the evaluation of those impacts, is contained in Section 4.2.7.

- The BLM CFO has limited information about the specific areas of significance to tribes, including locations of Traditional Cultural Properties (TCPs) and sacred sites, in the planning area. This information is relevant to reasonably foreseeable significant adverse effects, given the possibility that management decisions could allocate land uses to activities that would irreversibly damage unknown TCPs and sacred sites. Similar to the archeological resource discussion above, there are laws and regulations in place, such as the American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, NHPA, Archaeological Resources Protection Act, and Executive Order 13175: *Consultation and Coordination with Indian Tribal Governments*, which reduce the potential for signification adverse effects under each alternative. In addition, the CFO conducts tribal consultation efforts throughout the year based on the proposed implementation-level activities that are being considered for BLM decision making. Tribal consultation was also conducted during development of the RMP. Through these tribal consultation efforts, the CFO would learn of sacred sites and TCPs to be avoided when implementing site-specific projects. Existing scientific evidence that is relevant to evaluating reasonably foreseeable impacts to tribal rights and interests, and the evaluation of those impacts, is contained in Section 4.5.1.
- There is limited information about past surface disturbance within the planning area. Information and estimates of surface disturbance from past management decisions within the planning area is important to inform cumulative impacts analysis. The CFO has records from past right-of-way (ROW) authorizations, approved Applications for Permit to Drill (APDs), and mineral material contracts, from which acreage estimates for surface disturbance can be developed. However, less information is available about surface disturbance resulting from past recreation, livestock grazing, travel management, and non-federal activities. This information is relevant to reasonably foreseeable significant adverse effects, considering that the BLM is directed to include past actions within the planning area to provide context for cumulative effects analysis (BLM 2008a). The information available to the BLM for this RMP provides a representative sample of the types of activities and associated levels of surface disturbance within the planning area. Knowing the precise location and size of all past disturbance in the planning area would not likely change the reasonably foreseeable significant adverse impacts because the past disturbance is one element of cumulative impacts (which also includes present and reasonably foreseeable future actions) and the representative sample provides a dependable estimate that serves as a base for incremental impacts to be analyzed. Complete information about past disturbance activities and associated surface disturbance impacts is not essential to a reasoned choice among alternatives because "once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects" (CEQ 2005). This approach was used for the cumulative impacts analysis contained in Section 4.1.6.
- The karst inventory for the CFO is incomplete, and existing inventories cover approximately 2% of BLM-administered lands containing high or medium karst potential in the planning area. This incomplete information is relevant to reasonably foreseeable significant adverse effects, given the possibility that management decisions would allocate land uses to activities that may damage currently unknown karst resources, which would constitute a significant adverse effect. This incomplete information is, however, not essential for a reasoned choice among alternatives. Potential impacts to karst resources are similar among all action alternatives because other environmental laws and regulations (Federal Cave Resources Protection Act, Clean Water Act, and Safe Drinking Water Act) would reduce the potential for significant adverse effects under each alternative and because site-specific NEPA would be required prior to implementation of proposed activities. Incomplete information regarding the location of karst resources is, in this sense, less useful to the decision maker, who is assured that no matter which alternative selected, significant adverse effects to karst resources could be avoided. Existing scientific evidence that is relevant to evaluating reasonably foreseeable impacts to karst resources, and the evaluation of those impacts, is contained in Section 4.2.2.

4.1.5 Mitigation

There are several mitigative prescriptions proposed in this RMP, and they vary by alternative. COAs and BMPs (Appendix O), and stipulations (Appendix C) also serve to mitigate impacts.

4.1.6 Irreversible and Irretrievable Impacts

Section 1502.16 of CEQ regulations requires that the discussion of environmental consequences include a description of "any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented." An irreversible commitment of a resource refers to decisions impacting the use of nonrenewable resources, and results in the resource being permanently lost. For example, the production of oil and gas is an irreversible commitment of these resources. An irretrievable commitment of a resource refers to decisions resulting in the loss of production or use of a resource. For example, in the construction of a road, the vegetation is lost for as long as the road remains.

No irreversible and irretrievable commitment of resources is anticipated for karst resources, air resources, renewable energy, travel management, recreation, land use authorizations, social and economic conditions, and health and safety,

4.1.6.1 Soil and Water Resources

Surface-disturbing activities may result in soil erosion. Soil formation requires thousands of years to replenish. Eroded soil and lost productivity cannot be recovered. The loss of topsoil from soil erosion results in an irreversible loss of soil productivity. Depletion of water from BLM actions may result in an irretrievable commitment of water. The production of water from oil and gas wells in the planning area may be an irretrievable commitment of groundwater once it reaches the surface. Disposal of produced wastewater into authorized aquifers may be an irretrievable loss of a resource that has been pumped to the surface, as well as added contamination of the aquifer with the produced water contaminants.

4.1.6.2 Vegetation

Surface-disturbing activities associated with development, OHV use, and other activities may result in irretrievable impacts to vegetation communities and diversity through vegetation loss and proliferation of noxious or invasive weeds. Irretrievable loss of riparian habitat could occur due to grazing, visitor trampling, and construction-related removal of riparian habitat. Noxious weed infestation of disturbed riparian areas could become an irreversible impact based on past difficulties controlling invasive species in riparian habitat. An irretrievable loss of riparian habitat could also occur if riparian habitat is converted to upland habitat (by filling, draining, or other landscape alterations) in association with the placement of utility corridor infrastructure.

4.1.6.3 Fish, Wildlife and Special Status Species

Surface disturbance associated with mineral development, fire treatments, or OHV use may result in irretrievable impacts to fish and wildlife resources, including special status species habitat, because watershed health and overall riparian condition would be degraded.

4.1.6.4 Wildland Fire and Fuels Management

The prohibition of fuels reduction and vegetation treatments could result in irretrievable losses in habitat value as vegetation types move away from desired future condition. However, non-surface-disturbing vegetation treatments and/or effective suppression followed by effective rehabilitation/restoration could prevent these impacts from being irreversible.

4.1.6.5 Cultural Resources

Because the location and nature of all cultural resources in the area under consideration are unknown, it is not possible to determine the amount or level of irreversible and/or irretrievable impacts to cultural resources in the CFO planning area. However, it is likely that, in spite of compliance with Section 106 of the NHPA and BLM policy and guidelines, some non-mitigatable impacts would occur and would likely be irreversible because restoration of an archaeological site is typically very difficult.

4.1.6.6 Paleontological Resources

Although many impacts to paleontological resources are addressed through mitigation (collection and curation to benefit scientific research and education), there would be an irreversible impact to the in-situ value of the resource when removed. Irretrievable and irreversible impacts would also occur when unavoidable adverse impacts destroy paleontological resources.

4.1.6.7 Lands with Wilderness Characteristics

In lands not managed to protect, preserve, and maintain their wilderness characteristics, the loss of naturalness and/or solitude due to surface-disturbing activities (such as mineral development or cross-country OHV use) could be irretrievable.

4.1.6.8 Visual Resources

In areas that are not managed to protect visual resources, irretrievable impacts to visual resources would occur from surface disturbance caused by construction and development and by fire management (until vegetation regrowth occurs).

4.1.6.9 Minerals

The extraction and development of mineral resources from the CFO planning area would result in both an irreversible and irretrievable loss of those mineral resources due to their finite nature. The impacts would be irretrievable and irreversible because, once extracted, the mineral resource could not be used again, nor could they be replaced in the foreseeable future.

4.1.6.10 Livestock Grazing

Loss of forage from development and other activities would constitute an irretrievable impact to livestock grazing. Grazing closures within the planning area would also constitute an irretrievable impact to livestock grazing until those areas are made available for grazing again.

4.1.6.11 Land Tenure

All alternatives permit land tenure adjustments (sales, exchanges) that may result in the irretrievable loss of lands from public ownership when they are transferred to state or private ownership.

4.1.6.12 Special Designations

In ACECs or wild and scenic rivers (WSRs) not designated in an alternative, surface-disturbing activities (such as mineral development and cross-country OHV use) could result in adverse impacts to relevant and important values and outstandingly remarkable values, respectively. However, these impacts would not be expected to result in an irreversible and irretrievable commitment of these resource values.

4.2 RESOURCES

4.2.1 Soil and Water Resources

This section discusses potential impacts to soil and water resources from proposed management actions of other resources and resource uses. Existing conditions concerning soil and water resources are described in Section 3.2.2.

4.2.1.1 Analysis Methods

4.2.1.1.1 Indicators

For the purposes of this broad-scale analysis, the primary indicator of impacts to soil and water resources is the amount of surface disturbance caused by management decisions made for other resources, particularly surface disturbance that occurs in highly erodible, reclamation-limited, or other sensitive soils.

4.2.1.1.2 Methods and Assumptions

Management actions associated with the following resources and land uses may result in impacts to soil and water resources and are discussed in detail below: land use authorizations, mineral development, livestock grazing, lands with wilderness characteristics, recreation, special designations, visual resources, renewable energy, and travel management.

Management decisions associated with the following resources would not impact soil and water resources because they either do not include surface-disturbing activities or there are no management decisions proposed in Chapter 2 and are, therefore, not discussed: air resources, cave and karst resources, soils, water resources, wildlife and fish, special status species, paleontological and cultural resources, health and safety, and land tenure.

The following assumptions were used for the analysis of management action impacts on soils and water resources:

- Any surface disturbance proposed on highly erodible soils has the potential to have a major impact to the soil resource, since soil erosion affects an area larger than the physical disturbance. Reclamation in these areas is challenging. Extra steps are necessary to conserve the soil resource.
- The BLM would use soil survey data and interpretations to predict soil behavior, limitation, or suitability for a given activity or action. Soil interpretations are developed by the cooperators in the National Cooperative Soil Survey (NCSS) and maintained by the Natural Resources Conservation Service (NRCS). Soil interpretations (see Glossary) are ever evolving; therefore, as new or updated soil interpretations become available, they would supersede prior interpretations. Soil interpretations do not preclude activities or actions; rather, they provide a reasonable guide to the risks, limitations, and probable outcomes of a particular use or practice. The information is not site specific and does not eliminate the need for on-site investigation of the soil.
- Substantial surface disturbance to soil, including compaction of soil or loss of vegetation cover, could increase water runoff volume and velocity, increase downstream sediment loads, and lower soil productivity, thereby degrading water quality, altering channel morphology, and affecting overall watershed health.
- Linear disturbances such as pipelines, utility corridors, and transmission lines would be managed consistent with other resource requirements and BMPs.

4.2.1.2 Direct and Indirect Impacts

The degree of impact to soil resources would depend on various factors, including soil characteristics and the amount, location, and type of surface disturbance. Resulting impacts from surface-disturbing activities would potentially include decreased permeability, accelerated erosion (from wind and water) and sedimentation, soil and vegetation loss, and overall changes in soil chemistry and potential reduction in

productivity. The greatest anticipated adverse impacts on soil resources would come from those surface-disturbing activities occurring on fragile and sensitive soils (including microbiotic soil crusts [MSCs]), steep slopes (Map 3-37), or geologically unstable locations.

Proposed decisions that include surface-disturbing activities that impact soils could also adversely affect water quality. Alternatively, restrictions on surface-disturbing activities would help to protect and maintain current water quality and to minimize erosion and sedimentation. Impacts to water resources, as a result of surface-disturbing activities, such as mineral exploration and development and livestock grazing, would include changes to quantity and quality (water chemistry) of surface water and groundwater, potential changes to water volume and velocity, channel morphology alteration, and effects to overall watershed health. Loss of vegetation or prevention of revegetation would potentially lead to an increase or introduction of noxious weeds that often have greater water requirements than native plants and would, therefore, potentially outcompete them. Increased runoff from bare (unvegetated) surfaces leads to erosion, sedimentation, and potential contaminant delivery to nearby waterways. Industrial contaminants, chemicals associated with vehicles, nutrients and pathogens from livestock, and herbicides for vegetation treatments can migrate to surface water and groundwater.

Management actions that prohibit surface disturbances would benefit both water and soil resources through improvements in ground cover and soil productivity (due to lack of disturbance that would directly remove vegetative cover leading to bare ground and subsequent decreased soil productivity), improvements in water quality and reduction in groundwater depletion, greater retention of organic matter, increased soil moisture storage and reduced soil erosion, sedimentation and compaction.

Effects from soil and water management actions on karst resources, air quality, upland vegetation, noxious weeds, other natural resources, and travel are discussed under those sections.

4.2.1.2.1 Impacts of Land Use Authorization Actions on Soil and Water Resources

Land use authorizations generally include a number of activities and features, such as access roads, transmission lines, and pipelines and their ROWs, that would result in surface disturbances and vehicle and equipment transportation, both of which could contribute to adverse impacts to soil and water resources. Potential impacts would include direct loss of vegetation and topsoil and subsequent decrease in soil productivity, soil compaction, and increased erosion and alterations in overall groundwater and surface water quality. Additional impacts to soils and water would be perpetuated over time by maintenance activities for those features, although mitigation and BMPs in place would help alleviate adverse impacts.

Those areas that are classified as ROW avoidance, exclusion, or withdrawal areas would minimize surface disturbances and, therefore, beneficially impact soil and water resources. The number of acres under each of these categories varies across the alternatives and is depicted in Table 4-2.

Table 4-2. Acreages of Right-of-way Avoidance, Exclusion, and Acres Open by Alternative

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540
Open	2,051,927	798,544	757,380	1,610,692	1,749,782
Total	***2,089,949***	***2,089,731***	***2,089,735***	***2,089,689***	***2,089,682***

Note: Total may be off by an acre due to rounding.

Impacts from Management Common to All Action Alternatives

Under management common to the action alternatives, all projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level. The degree of impact on soils and water would vary, depending on the project, its location, and the soil composition of the area.

Impacts from the No Action Alternative

Under the No Action Alternative, current management pertaining to land use authorizations would continue, as specified in the guidelines in Appendix 2 of the 1997 Carlsbad RMP Amendment. Approximately 184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. A total of 37,361 acres, primarily within Special Management Areas (SMAs), would remain designated as avoidance areas, and 7,056 acres would be designated as exclusion areas. Also, approximately 30,965 acres would remain designated as avoidance, areas and 2,051,927 acres would remain open (see Table 4-2). Adverse impacts to soil and water resources, as those described at the beginning of this section, would continue as ROW applications are granted. Mitigation and remediation actions in place, however, would help minimize these impacts.

Impacts from Alternative A

Under Alternative A, 629,149 acres would be designated as avoidance and 662,038 as exclusion. Approximately 788,544 acres would remain open across the planning area (see Table 4-2). Compared to the No Action Alternative, there would be a 31.4% increase in exclusion acreage designated and a 28.6% increase in acres designated as avoidance areas. The magnitude of and potential for adverse impacts to soil and water resources, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Impacts from Alternative B

Under Alternative B, 413,654 acres would be designated as avoidance and 918,701 acres as exclusion. Approximately 757,380 acres would remain open across the planning area (see Table 4-2). Compared to the No Action Alternative, there would be a 39.7% increase of exclusion acreage designated and a 18.3% increase in acres designated as avoidance areas, the magnitude of and potential for adverse impacts to soil and water resources, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Impacts from Alternative C

Under Alternative C, 313,619 acres would be designated as avoidance and 165,378 acres as exclusion. Approximately 1,610,692 acres would remain open across the planning area (see Table 4-2). Compared to the No Action Alternative, there would be a 7.6% increase in exclusion acreage designated and a 13.5% increase in acres designated as avoidance areas, the magnitude of and potential for adverse impacts to soil and water resources, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Impacts from Alternative D

Under Alternative D, 270,360 acres would be designated as avoidance and 69,540 acres as exclusion. Approximately 1,749,782 acres would remain open across the planning area (see Table 4-2). Compared to the No Action Alternative, there would be 3% increase in exclusion acreage designated and a 11.4% increase in acres designated as “avoidance” areas, the magnitude of and potential for adverse impacts to soil and water resources, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

4.2.1.2.2 Impacts of Livestock Grazing Actions on Soil and Water Resources

The impacts from livestock grazing proposed decisions on soil and water resources would depend on a range of factors including soil type, location and number of acres open to grazing, proximity to riparian systems and water bodies, and the grazing regime used. Nonetheless, as the most widespread land management practice in the western United States, livestock grazing has been shown to have many adverse impacts at both landscape and regional levels (Belsky et al. 1999; Fleischner 1994; Valone et al. 2002). Potential impacts from grazing to soil and water resources include soil compaction and erosion and an overall decrease in soil productivity, loss of stream bank stability and long-term damage to riparian soils

and vegetation, decreased water quality, and alterations in stream hydrology. Fecal contamination of surface water runoff and, consequently, potential contamination of wells, aquifers, and springs (Pasquarell and Boyer 1995), some of which are important municipal and agricultural water sources, represents another potential impact.

Sensitive gypsum soils, found throughout the planning area, would be particularly impacted from surface disturbances including livestock grazing, as these soils have minimal vegetative cover and are subject to severe erosion if existing vegetative cover is lost as a result of trampling. Reclamation in areas with gypsum soils is difficult. In areas where cattle congregate, grazing would contribute to excessive soil compaction, trampling, and degradation of the vegetative community resulting in subsequent adverse impact to soil and water resources.

Impacts to soil and water resources resulting from grazing are quantitatively assessed based on the number of acres open or closed to grazing. The number of acres open or closed to grazing varies by each of the alternatives and is shown in Table 4-3.

Table 4-3. Livestock Grazing Management Action Acreages by Alternative

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
Closed	5,226	493,120	153,583	8,115	3,594
Total	***2,091,333***	***2,091,318***	***2,091,308***	***2,091,347***	***2,091,353***

Note: Difference in total acres between all alternatives can vary up to 250 acres due to geoprocessing operation where slivers of area are created when two or more data sets are intersected.

Impacts from the No Action Alternative

Under the No Action Alternative, current management would continue, including the authorization of approximately 350,000 animal unit months (AUMs) to 200 permittees and approximately 18,000 AUMs to 62 lessees. These numbers would be supported by quantitative field monitoring and any future increase or decrease in authorized numbers would need to be backed with similar data. The exclusion of livestock grazing from 13 SMAs (totaling 4,969 acres) and also from within the Black River Management Area would remove adverse impacts to soil and water resources in those locations.

Overall, under the No Action Alternative, approximately 5,226 acres across the planning area would remain closed to livestock grazing (see Table 4-3). Livestock grazing would be removed from the Black River Management Area, a small portion of land outside the Black River Management Area, and the Delaware River (both sides of U.S. 285), as well as around all riparian springs. A description of the types of impacts resulting from livestock grazing on soil and water resources are discussed at the beginning of this section and also under management common to all.

Impacts from Alternative A

Under Alternative A, 493,120 acres would be closed to grazing, representing approximately 30% of the planning area (see Table 4-3) and would include 5,000 acres of unallotted tracts where the available vegetation would be made exclusively available for wildlife and watershed health.

Under this alternative, all riparian springs and their associated zones would be closed to grazing, as well as the Delaware River riparian area (both sides of U.S. 285), the Black River Management Area, and a small portion of land just outside the Black River Management Area (grazing prohibited within 656 feet of the river bank on either side). Removal of grazing in the areas listed above would improve overall watershed health through the increase in soil stability and a decrease in erosion and subsequent excessive sedimentation.

Compared to the No Action Alternative, which does not remove livestock grazing from as many riparian areas and areas with springs and closes only 5,226 acres to livestock grazing (compared to the 493,120 acres closed under Alternative A), the magnitude of adverse impacts to soil and water resources would be greatly reduced under Alternative A.

Impacts from Alternative B

Under Alternative B, livestock grazing would be excluded on 153,583 acres (see Table 4-3), which represents approximately 7% of the planning area. The following areas would also have grazing excluded under this alternative: riparian spring areas, the Cottonwood Day Use area, the Black River outside the management area (grazing prohibited within 656 feet of the river bank on either side), Pierce Canyon, Yeso Hills, South Texas Hill (sensitive soils), cultural resource ACECs, known heronries, open OHV areas, the dune areas of Hackberry Lake SRMA, the Birds of Prey Grasslands ACEC, the Gypsum Soils ACEC, the Pecos Bluntnose Shiner ACEC, and Pope's Well ACEC. Removal of grazing in the areas listed above would improve the overall watershed health through the increase in soil stability and a decrease in erosion and subsequent excessive sedimentation.

Compared to the No Action Alternative, which does not remove livestock grazing from as many riparian and spring areas and closes only 5,226 acres to livestock grazing (see Table 4-3) (compared to the 153,583 acres closed under Alternative B), the magnitude of adverse impacts to soil and water resources would be greatly reduced under Alternative B.

Impacts from Alternative C

Under Alternative C, 8,115 acres would be closed to livestock grazing (see Table 4-3), representing less than 1% of the planning area. However, sensitive areas would be closed to livestock grazing and include riparian pastures (seasonal) adjacent to the Delaware River (both sides of U.S. 285), as well as those areas around riparian springs and their associated riparian zones. Limiting grazing in these sensitive areas would minimize adverse impacts resulting from grazing, such as erosion, soil compaction, and subsequent excessive sedimentation of the waterways.

Compared to the No Action Alternative which closes only 5,226 acres to livestock grazing (see Table 4-3) across the planning area (compared to the 8,115 acres closed under Alternative C) and does not prohibit grazing around all riparian springs and their associated riparian zones, the magnitude of adverse impacts to soil and water resources would be slightly reduced under Alternative C.

Impacts from Alternative D

Under Alternative D, 3,594 acres would be closed to livestock grazing (see Table 4-3), representing less than 1% of the planning area. Additionally, those areas containing riparian springs and their associated riparian zones would also be closed to grazing, as well as the Black River Management Area. Limiting grazing in these sensitive areas would reduce adverse impacts resulting from grazing, such as trampling, erosion, soil compaction, water contamination, and subsequent excessive sedimentation of the waterways.

Compared to the No Action Alternative, which closes only 5,226 acres to livestock grazing (see Table 4-3) across the planning area (compared to the 3,594 acres closed under Alternative D) and does not prohibit grazing around all riparian springs and their associated riparian zones, the magnitude of adverse impacts to soil and water resources would be slightly reduced under this alternative.

4.2.1.2.3 Impacts of Travel Management and Recreation on Soil and Water Resources

Travel management and recreation would have the potential to adversely impact soil and water resources wherever OHVs operate and wherever recreation activities are not managed. OHVs cause physical destruction to the soil surface and vegetative cover, which can lead to compaction, reduction of infiltration, and reduction of herbaceous cover, all of which can lead to increased erosion and sedimentation. Roads and OHV routes can be primary sources of sediment and salinity delivery to rivers, streams and other water bodies. OHV recreation use during periods of high soil moisture content could exacerbate localized erosion and soil compaction and damage existing vegetation.

Large group recreation events and camping would potentially compact soils, damage streambanks and riparian areas, erode soils, and transport contaminants to surface water and groundwater. Compacted soils increase volume and velocity of runoff and would result in sedimentation in nearby waterways. Groundwater impacts could include depletion from well water use and contamination from transport of chemicals and organics in soil.

Additionally, soil disturbances resulting from OHV and off-trail recreation use would negatively impact soil productivity and water infiltration rates. A recent U.S. Geological Survey (USGS) synthesis of the literature summarizes the impacts of OHV use on soil resources (Ouren et al. 2007). The report concluded that the negative effects of OHV activities on the functioning of soil and water resources included soil compaction, diminished water infiltration, diminished presence and impaired function of MSCs, and accelerated erosion rates. Compacted soils inhibit water infiltration from precipitation which, in turn, limits soil moisture availability for vegetation and increases the volume and velocity of runoff. Where MSCs are disturbed or destroyed, soil erosion from water and wind may increase beyond rates found in undisturbed sites with similar soils and conditions; nutrient-cycling processes are also likely to be disrupted, potentially leading to declines in soil fertility and a decrease in vegetative cover (Ouren et al. 2007). Managing for OHV limited use and closing some areas would minimize and help eliminate adverse impacts to soil and water resources.

Restricting OHV use to designated routes would limit adverse impacts to soil and water resources. However, all alternatives differ in the total number of acres limited or closed to OHVs. Table limiting OHVs to designated and existing routes both generally result in no additional surface disturbance, these two OHV use categories were analyzed together for each alternative (Table 4-4).

Table 4-4. Travel Management Decisions by Alternative (acres)

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed to OHV use	55,966 (2.7%)*	52,028 (2.5%)	41,936 (2.0%)	38,738 (1.9%)	38,737 (1.9%)
Total	2,091,273	2,091,326	2,091,327	2,091,320	2,091,321

* Number in parentheses is the percentage of total area.

Impacts from Management Common to All

Under all of the proposed alternatives, management decisions would include the following: the Phantom Banks Heronries would be designated as limited to OHV use, motorized wheeled cross-country travel would be allowed for any military, fire, search and rescue, or law enforcement vehicle used for emergency purposes and motorized wheeled cross-country travel for leases and permittees would be limited to the administration of a BLM lease or permit. Additional management actions common to all would include the following: Recreation Area Management Plans (RAMPs) would be prepared for all designated Special Recreation Management Areas (SRMAs) and would address the types of management actions necessary to achieve the recreation objectives put forth in this RMP; the Conoco Lake (7 acres) SRMA would be a ROW exclusion area, which would reduce impacts to soil and water resources caused by ROW-related surface disturbance; the Dunes Recreation Management Zone (RMZ) would require a No Surface Occupancy (NSO) stipulation on active dunes and developed leases for future areas; and the Trails RMZ would limit travel to designated trails.

These actions would minimize adverse impacts (as described at beginning of this section) to both soil and water resources resulting from travel and recreation management decisions.

Impacts from Management Common to All Action Alternatives

Proposed travel management and recreation decisions common to all action alternatives that would impact soil and water resources include the requirement that all new road construction adhere to the BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development – The Gold Book* (BLM 2007a) and that all surfacing material on oil and gas roads must be removed at the time of abandonment. Camping is also prohibited within 900 feet of any natural or human-made water source (excluding the Pecos River).

Trails would be designated within the Black River SRMA including extending trails to Ladder Hole from the parking area. These trails would be for non-motorized use only. Increasing the number of trails would increase the potential for impacts to soil and water resources, such as soil compaction, erosion, sedimentation, and the spread of noxious weeds and invasive plants, which can degrade soil productivity. However, restrictions on motorized use would help limit the potential for adverse impacts to soil and water resources caused by OHVs. Hackberry Lake (new boundary minus lesser prairie-chicken [*Tympanuchus pallidicinctus*; LPC] habitat areas and paleontological site) would be managed as an SRMA. Also, trails in the La Cueva SRMA (1,565 acres) would be limited to non-motorized use only (43 CFR 8341.1). Restrictions on motorized use would help reduce the potential for impacts to soils and water resources, as described above. The SRMA would be designated as a ROW corridor. The fewer the acres managed for ROW, the less potential for impacts to soil and water resources from ROW-related surface disturbance.

These management actions would minimize adverse impacts to soil and water resources, such as soil compaction and erosion, contamination, and overall reduction in soil productivity and water quality (see additional impacts described at the beginning of this section).

Impacts from the No Action Alternative

Under the No Action Alternative, current management addressing travel and recreation would continue. Existing OHV closures within 55,966 acres include the Laguna Plata and Pope's Well areas. Approximately 2,035,307 acres would be OHV limited (see Table 4-4).

Management actions regarding campfires, firewood gathering, and equestrian activities would remain unchanged from the 1988 RMP. Thus, impacts to soil and water resources from these recreational activities would be a continuation of the trends under existing conditions. The types of direct and indirect impacts that would be expected are described at the beginning of this section.

Hackberry Lake SRMA (53,560 acres) would be open to leasing subject to the Secretary's Potash Order. The fewer the acres managed for mineral exploration and development, the less potential for impacts to soil and water resources from surface disturbance caused by these activities. The entire SRMA would be managed as OHV limited, which would beneficially maintain soil disturbances along existing trails.

The Pecos River corridor would be managed as an SRMA with NSO stipulations to future oil and gas leases on 6,008 acres. Approximately 6,006 acres of the SRMA would be withdrawn from mining claim location. The fewer the acres managed for mineral exploration and development, the less potential for adverse impacts to soil and water resources from surface disturbance caused by these activities. Surface disturbance would be restricted throughout the SRMA to reduce erosion and minimize other impacts to soil and water resources. Approximately 122 acres around the Red Bluff Reservoir would be closed to OHV use and the remaining SRMA acres would be OHV limited. Restricting OHV use would reduce the potential for adverse impacts to soil and water resources.

OHV limited use would be allowed in the 11,207-acre Pecos River ERMA on 10,124 acres, but no developed trails would be allowed. Likewise, OHV limited use would be allowed in the Hay Hollow area (12,913 acres), but no trails would be developed. The fewer trails, the less potential for adverse impacts to soil and water resources.

Impacts from Alternative A

Under Alternative A, 2,039,299 acres (97.5% of the planning area) would be OHV limited, and 52,028 acres (2.5%) would be closed (see Table 4-4).

Alternative A would have the same impact as described under the No Action Alternative because the acreage differences are relatively small.

Also, under Alternative A Alkali Lake (944 acres) would be managed as an SRMA and would be a ROW exclusion area on dunes and a ROW avoidance area elsewhere. The fewer the acres managed for ROWs, the less potential for soil erosion, sediment loading, alterations in surface drainage patterns, and other adverse impacts to soil and water resources from ROW-related surface disturbance.

The Pecos River Corridor SRMA (6,008 acres) would be managed to provide recreation opportunities on public land parcels with an emphasis on natural and scenic qualities. Travel in the SRMA would be OHV limited, which would help limit adverse impacts to soil and water resources. The SRMA would be managed as open with major constraints for fluid leasables and closed to locatable and salable development. The more restrictions on mineral exploration and development, the less potential for adverse impacts to soil and water resources from surface disturbance caused by these activities.

Square Lake (2,975 acres) would be managed as an ERMA with an objective to provide for open OHV play experiences on open dunes designating OHV limited travel to designated routes between dunes. The ERMA would be closed to camping during the LPC breeding season (March 1–June 15, 3:00–9:00 a.m.). Restricting camping activities would reduce the potential for impacts to soil and water resources where applicable during this period. OHVs would be limited to designated routes between dunes, which would reduce the potential for impacts to these sensitive soils. The fewer the acres managed for mineral exploration and development, the less potential for adverse impacts to soil and water resources from surface disturbance caused by these activities.

The Pecos River Equestrian Trail and Hay Hollow Equestrian ERMAs would be managed the same as is described under the No Action Alternative.

Impacts from Alternative B

Under Alternative B, 2,049,391 acres (98.0% of the planning area) would be OHV limited, and 41,936 acres (2.0%) would be closed. The nature of the impacts would be the same as those described for Alternative A, but the beneficial impacts of closure would occur on a smaller area under this alternative, with more of the planning area designated as limited.

Qualitatively, this is the same impact as described under the No Action Alternative.

Alkali Lake would be managed as an SRMA, with the same prescriptions as Alternative A. Square Lake (2,975 acres) and the West Well Dunes (624 acres) would be managed as ERMAs. Travel in the ERMAs would be limited to designated trails/dunes and trails would be expanded on case-by-case basis, Restrictions on travel would reduce the potential for adverse impacts to soil and water resources, as described at beginning of this section. All 624 acres would be managed as open for mineral development and also open to grazing and renewable energy development.

The Pecos River Equestrian Trail would be managed as an ERMA. The fewer the acres managed for ROWs, the less potential for impacts to soil and water resources from ROW-related surface disturbance. New trails would be designated/constructed in combination with existing trails, excluding the Delaware portion of the ERMA. An increased number of trails would increase the potential for adverse impacts to soil and water resources, as described at the beginning of this resources section. No motorized or mechanized use would be allowed on singles track portions of the equestrian trail. The more restrictions on motorized and mechanized travel, the less potential for adverse impacts to soil and water resources.

The Hay Hollow Equestrian Trail (12,913 acres) would be managed as an ERMA. The ERMA would be open to grazing, which would increase the potential for impacts to soil and water resources, such as soil compaction, sediment loading, and decreased soil productivity and water quality. Mineral designations would include no acreage closed to leasable mineral development and NSO designation on 7,296 acres. Approximately 7,296 acres would be closed to salables and 7,296 acres withdrawn from locatable mineral development. The fewer the acres managed for mineral exploration and development, the less potential for adverse impacts to soil and water resources from surface disturbance caused by these activities.

Impacts from Alternative C

Under Alternative C, 2,052,582 acres (98.1% of the planning area) would be OHV limited, and 38,738 acres (1.9%) would be closed (see Table 4-4). The nature of the impacts would be the same as those described for Alternative A, but there would be fewer beneficial impacts because OHV closure would occur on a smaller area under this alternative, with more of the planning area designated as limited.

Qualitatively, this is the same impact as described under the No Action Alternative.

The Alkali ERMA would be OHV limited and would therefore have the same potential for impacts to soil and water resources as described under the No Action Alternative.

The Pecos River Equestrian Trail would be managed as an ERMA with the same prescriptions described under Alternative B. The Hay Hollow Equestrian ERMA would be managed the same as is described under the No Action Alternative. Square Lake would be managed as an ERMA with the same prescriptions as those described under Alternative A.

Impacts from Alternative D

Under Alternative D, 2,052,584 acres (98.1% of the planning area) would be OHV limited, and 38,737 acres (1.9% of the planning area) would be closed to OHV use (the same as Alternative C).

Qualitatively, this is the same impact as described under the No Action Alternative, with the same impacts as discussed under Alternative C because the acreages are the same.

Pecos River Equestrian Trail ERMA would designate/construct new trail in combination with using existing trails, with no motorized or mechanized use allowed on single track portions of the equestrian trail. The more restrictions on motorized and mechanized travel near riparian areas, the less potential for adverse impacts to soil and water resources, as described at the beginning of this resources section. The West Well Dunes (624 acres) would be managed as an ERMA with the same prescriptions as those described under Alternative B.

4.2.1.2.4 Impacts of Special Designation Areas on Soil and Water Resources

Special designation proposed management actions would potentially impact soil and water resources in cases where portions of these areas were open to surface-disturbing activities, such as livestock grazing and mineral development. Adverse impacts would be particularly magnified in those areas with sensitive soils and MSCs. Impacts associated with these activities would include soil compaction and excessive erosion, decreases in soil productivity and water quality, contaminant delivery to drainages and water bodies, alterations in surface and subsurface drainage patterns and possible degradation of groundwater. Mitigation during surface-disturbing activities would help to reduce or eliminate these impacts to soil and water resources.

ACECs

Under all management alternatives, ACECs would be managed to protect the relevant and important values for which the ACEC is to be designated and would generally reduce long-term impacts to soil and water resources that occur within their boundaries. The various ACECs have specific management goals and actions under each of the alternatives. Those ACECs that have relevant and important soil and/or water resources and also those ACECs with substantial acreage open to surface-disturbing activities would be most susceptible to negative impacts upon soil and water resources. Lands designated as ACECs and associated acreages vary among alternatives and are presented in Table 4-5.

ACEC management impact analysis for soil and water resources was based on the number of acres open to leasable, salable, and locatable mineral management decisions, OHV use, and livestock grazing, which would have direct and indirect impacts on soil and water resources because of the surface disturbances associated with these actions (see Table 4-5). All designated ACECs would be managed as ROW avoidance areas and, therefore, ROW acreage within ACECs is not included in the table.

Table 4-5. ACEC Acreages Closed to Livestock Grazing, OHV Use, and Mineral Development by Alternative

Land Use	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres designated as ACECs	13,435	495,042	561,433	98,562	28,894
Total acres closed to grazing	0	449,747	135,480	5,735	201
Acres closed/limited to OHV use	12,608	479,960	546,867	93,641	27,224
Acres of NSO/closed to leasable mineral development	11,997	422,462	494,794	44,683	28,894
Acres closed to salable mineral development	12,613	197,644	298,343	44,824	26,468
Acres withdrawn from locatable mineral development	13,434	96,781	154,915	43,878	26,470

Impacts from the No Action Alternative

Under the No Action Alternative, current ACEC designations would continue as outlined in the 1988 RMP. Five existing ACECs totaling 13,435 acres (see Table 4-5), would continue to be managed under this alternative with no additional ACECs designated. Under this alternative, approximately 89% of the total ACEC acreage would remain designated as NSO/closed to leasable mineral exploration and development, 94% closed to salable development, and 99% would be recommended for withdrawal from locatable mineral development (see Table 4-5). Virtually all ACEC acres would remain open to livestock grazing. Approximately 12,608 acres (94%) would be closed or OHV limited.

Adverse impacts, such as soil compaction and degradation, as well as vegetation removal, sediment loading, and potential contaminant delivery to water bodies, would continue within these ACEC acreages, all of which contain important soil and water resources.

Impacts from Alternative A

Under Alternative A, nine ACECs would be designated, representing 495,042 acres (see Table 4-5). This would mark a substantial increase in ACEC-designated acres compared to the approximately 13,435 acres designated under the No Action Alternative. Livestock grazing would be prohibited in the Carlsbad Chihuahuan Desert Rivers, Birds of Prey and Pecos Bluntnose Shiner ACECs, and reduced within the Gypsum Soils ACEC. All in all, 449,747 ACEC acres (91%) would be closed to grazing.

Under this alternative, 422,462 acres of total ACEC acreages would be designated as NSO/closed to leasable mineral development and 96,781 acres withdrawn from locatable mineral development. Additionally, 479,960 of total ACEC acreage would be /OHV limited.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-5.

Impacts from Alternative B

Under Alternative B, 15 ACECs representing 561,433 acres would be designated, representing a significantly sizable increase in the number of acres designated as ACECs compared to the No Action Alternative. Of this ACEC acreage, 494,794 acres would be designated as NSO/closed to leasable minerals development and 154,915 withdrawn from locatable mineral development (see Table 4-5). Additionally, livestock grazing would be prohibited on 135,480 ACEC acres (24%) and 546,867 acres would be closed/OHV limited. Adverse impacts, such as soil compaction and degradation, as well as vegetation removal and contaminant delivery to water bodies would be minimized within these ACECs.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-5.

Impacts from Alternative C

Under Alternative C, eight ACECs representing 98,562 acres would be designated. This would represent a substantial increase in the number of acres designated as an ACEC compared to the No Action Alternative. Under this alternative, 44,683 acres of ACEC acreages would be designated as NSO/closed to leasable minerals development; 43,878 acres withdrawn from locatable minerals development; 5,735 acres closed to livestock grazing and 93,641 acres closed and OHV limited (see Table 4-5). Adverse impacts, such as soil compaction and degradation, as well as vegetation removal and contaminant delivery to water bodies, would be minimized within these ACECs.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-5.

Impacts from Alternative D

Under Alternative D, five ACECs representing 28,894 acres would be designated, representing a large increase in the number of ACEC acres when compared to the No Action Alternative. Under this alternative, 28,893 ACEC acreages would be designated as NSO/closed to leasable mineral development and 26,470 acres withdrawn from locatable mineral development; 201 acres would be closed to livestock grazing, and 27,224 acres closed and OHV limited.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-5.

4.2.1.2.5 Impacts of Wilderness Study Areas on Soil and Water Resources

Impacts from Management Common to All

All soil and water resources within the four designated WSAs, comprising a total of 7,086 acres, would continue to benefit from additional protection through special management requirements, including a closed designation for all future leases and no reissuing of current leases once expired, which would enhance and preserve its wilderness values, including plant communities within the unit. In addition, new permanent facilities and new surface disturbance would be prohibited, all of which would minimize adverse impacts to soil and water resources, such as increased soil erosion and compaction, decreased soil productivity, increased runoff and potential contaminant delivery to water bodies.

Impacts from the No Action Alternative

Under the No Action Alternative, the four WSAs would remain under their current designation and managed accordingly under prescriptions outlined in the Carlsbad RMP (BLM 1988) as amended, such as closed to all future leasing or NSO designation, closed to salables, withdrawn from locatables, OHV limited, closed to or excluded from renewable energy and designated as Visual Resource Management (VRM) Class I, and also as a ROW avoidance area. These management prescriptions would continue to minimize adverse impacts to soil and water through restrictions on surface-disturbing activities.

Alternatives A, B, and C

If the WSA designation is removed, the four previously designated WSAs would be managed as closed to leasable and salable development and recommended for withdrawal from locatable development. Adverse impacts under these three alternatives would be comparable to those under the No Action Alternative and as described under management common to all.

Alternative D

Under Alternative D, adverse impacts resulting from loss of WSA designation would be greater than those found under the other alternatives because management prescriptions would be less stringent for surface-disturbing activities. Unlike the other four alternatives, leasable mineral development would be open with major constraints, salable mineral development would be open with moderate constraints and the areas would be open for locatable development. In addition, the proposed VRM class on these lands would be Class III.

Adverse impacts, as those described under management common to all alternatives, would be greater under Alternative D compared to the No Action Alternative and also compared to Alternatives A through C.

4.2.1.2.6 Impacts of Wild and Scenic Rivers on Soil and Water Resources

Impacts from Management Common to All Action Alternatives

Under Management Common to All Action Alternatives, the Black River would be recommended as suitable for inclusion in the NWSRS and would be given the same management prescriptions as other WSR areas, including a VRM Class II classification. Beneficial impacts to water and soil resources would occur, as the WSR designation would limit surface-disturbing activities that would potentially result in adverse impacts, such as decreased soil productivity and water quality, increased bare ground, increased soil compaction and erosion, and alterations in stream hydrology.

Impacts from the No Action Alternative

Under the No Action Alternative, the Black River would not be managed as part of the National Wild and Scenic River System (NWSRS) but since it was determined to be eligible as a WSR (see Appendix N) it would be managed to protect its eligibility until a suitability determination is made as part of this RMP process. The Black River would be managed with the following management prescriptions: designation as VRM Class III, closed to salable and recommended for withdrawal from locatable mineral development, with leasables open with major constraints (NSO). All ROW construction would continue to be designated under “avoidance” within WSR areas and all renewable energy development would be precluded.

The Delaware River would also not be managed as part of the NWSRS, but since it was determined to be eligible as a WSR (see Appendix N) it would be managed to protect its eligibility until a suitability determination is made as part of this RMP process. The Delaware River would be managed with various prescriptions, such as classifying certain segments of the river under VRM Class II and IV objectives, excluding areas adjacent to the river to renewables development and mineral development (open with major constraints) and designations as a ROW ”avoidance area.” The No Action Alternative mineral and renewable energy prescriptions would protect the soils in the two river segments by reducing or eliminating surface disturbance.

Impacts from Alternative A

Under Alternative A, the Black River would be recommended as suitable for inclusion in the NWSRS and would be managed with the following prescriptions: VRM Class II, travel limited to designated routes, closed to leasable and salable mineral development, withdrawn from locatable mineral development, and excluded from both ROW development and renewable energy projects.

Also, under this alternative the Delaware River (one segment comprising 8.22 miles) would be recommended as suitable for designation in the NWSRS and would be managed under same prescriptions above for the Black River. All of these prescriptions would minimize surface disturbance and, therefore, reduce adverse impacts to soil and water resources.

Compared to the No Action Alternative which does not designate either the Black or the Delaware River in the NWSRS, the magnitude of adverse impacts to soil and water resources would be smaller under this alternative.

Impacts from Alternatives B and C

Under both of these alternatives, proposed management concerning the Black River would be the same as those under Alternative A, resulting in minimized surface disturbance and potential adverse impacts to soil and water resources. The Delaware River (Segment 1) would not be recommended as suitable for inclusion in the NWSRS and would be managed with prescriptions, including designation as VRM Class III, OHV limited, and various portions open to leasables with standard lease terms and conditions (1.0 miles) and open with major constraints (7.5 miles). Locatable and salable mineral development would be open in some areas but closed or recommended for withdrawal in others.

Compared to the No Action Alternative, which does not designate the Black River in the NWSRS and would keep the Delaware River open to locatable mineral development, the magnitude of adverse impacts to soil and water resources would be smaller under these alternatives.

Impacts from Alternative D

Under Alternative D, management prescriptions in relation to the Black River would be the same as those under Alternatives A, B, and C with the exception of the allowance of leasable development open with major constraints on WSR areas. Proposed management of the Delaware River segment would be the same as under alternatives B and C.

Compared to the No Action Alternative, which does not designate the Black River in the NWSRS and would keep the Delaware River open to locatable mineral development, the magnitude of adverse impacts to soil and water resources would be smaller under this alternative.

4.2.1.2.7 Impacts of Lands with Wilderness Characteristics Actions on Soils and Water Resources

Those soil and water resources located within lands with wilderness characteristics units that are managed to protect wilderness characteristics would receive beneficial impacts as a result of additional management prescriptions aimed at protecting wilderness characteristics and further minimizing surface disturbances. The greater the number of acres managed in this manner, the greater the benefit to soil and water resources. When units are managed to emphasize multiple uses while applying some protective management (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics, there would be some long-term benefits to soil and water resources, but it would depend on the prescriptions for the individual units. See Section 4.2.9 Lands with Wilderness Characteristics for details. For this reason, the greater the number of acres managed to protect wilderness characteristics, the greater the protection afforded to soil and water resources. Where lands with wilderness characteristics units are managed to emphasize other multiple uses as a priority over protecting wilderness characteristics, ground-disturbing activities such as minerals development may still be allowed and would offer less protection to soil and water resources.

The acreages designated as lands with wilderness characteristics and their management vary by alternative and are represented in Table 4-6.

Table 4-6. Acres within Lands with Wilderness Characteristics by Alternative

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	*N/A	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	*N/A	0	18,964	30,595	0
Emphasizes other multiple uses	*N/A	0	0	30,862	65,446

* There are currently no units managed as lands with wilderness characteristics.

Impacts from the No Action Alternative

Under the No Action Alternative, soil and water resources would not receive any beneficial impacts because no lands are currently designated as lands with wilderness characteristics and, therefore, no soil and water resources would benefit from management prescriptions, as described above, specific to designated lands with wilderness characteristics.

Impacts from Alternative A

Under Alternative A, 66,666 acres would be managed to protect wilderness characteristics. Associated management prescriptions would benefit soil and water resources by closing all lands with wilderness characteristics acres to future leases, withdrawing all acres from locatables and salables, excluding ROWs, and designating travel as OHV limited. Beneficial impacts resulting from these management prescriptions would include decreased erosion, sedimentation, and potential for noxious weed invasion.

Compared to the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to soil and water resources is much greater under Alternative A.

Impacts from Alternative B

Under Alternative B, 47,611 acres would be managed to protect wilderness characteristics and 18,964 acres would be managed to emphasize other multiple uses while applying some protective management, and zero acres would be managed to emphasize other multiple uses.

Compared to the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to soil and water resources is much greater under Alternative B.

Impacts from Alternative C

Under Alternative C, 5,119 acres would be managed to protect wilderness characteristics, 30,595 acres would be managed to emphasize other multiple uses while applying some protective management, and zero acres would be managed to emphasize other multiple uses.

Compared to the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to soil and water resources is much greater under Alternative C.

Impacts from Alternative D

Under Alternative D, 1,221 acres would be managed to protect wilderness characteristics, zero acres would be managed to emphasize other multiple uses while applying some protective management, and 65,446 acres would be managed to emphasize other multiple uses.

Compared to the No Action Alternative, which would not manage any lands to protect wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to soil and water resources is slightly greater under Alternative D.

4.2.1.2.8 Impacts of Leasable, Salable, and Locatable Minerals Actions on Soil and Water Resources

Minerals management actions would include the fluid leasable minerals oil and gas; the solid leasable mineral potash; locatable minerals gypsum, copper, gold, uranium, etc.; and salable minerals sand, gravel, rock, etc. Surface-disturbing activities associated with mineral development and exploration can adversely impact soil and water resources in various ways, including loss of vegetative cover and soil productivity, increased soil compaction and erosion, sediment loading, and alterations in surface and stream hydrology. In addition, noxious weed infestations resulting from reclamation-limited soils would degrade soil productivity and potentially cause additional alterations in surface water hydrology. Mitigation plans and BMPs used during the implementation phase of surface-disturbing activities associated with mineral development would reduce the potential for adverse impacts, as those previously described.

The number of acres of surface disturbance expected to occur across the planning area as a result of mineral development varies by each alternative and is presented in Table 4-7. These new surface disturbances would have an adverse impact on soil and water resources through soil disturbance, potential contamination of streams, rivers, and other water bodies and additional impacts as those listed above. Subsurface disturbances would primarily result from the hydraulic fracturing wells and open pit mines. Hydraulic fracturing wells have the potential to contaminate groundwater resources through spills and accidental discharges.

The best impact indicator for minerals actions would be the total number of acres that are closed to further development and the number of wells predicted across the planning area. The greater the number of disturbed acres and wells, the greater the potential for negative impacts to soils and water resources (both surface water and groundwater).

Potential impacts from hydraulic fracturing would be analyzed by looking at the number of predicted wells on BLM-administered lands by alternative and the associated acres of disturbance and the amount of water consumed. The number of predicted wells is based on the percentage of land open to surface disturbance. Hydraulic fracturing has the potential to cause direct and indirect impacts to the groundwater resources during mineral development. Several of the processes used in mineral extraction require the use of hydraulic fracturing fluids or high concentration brine fluids that when managed improperly have the potential to be directly or indirectly discharged into the groundwater or surface water resources. Another potential direct impact of hydraulic fracturing is with the large amount of water resources needed during the process in an area already experiencing declining surface waters and aquifer levels. However, the oil and gas industry's reliance on surface water resources and recycling of fracturing fluids and/or produced water rather than the use of fresh groundwater resources would reduce the impact on groundwater availability. The BLM has management actions in place to mitigate the risks associated with hydraulic fracturing and ensure that it is a transparent process.

Potential impacts to water resources from oil and gas drilling and production conducted by hydraulic fracturing are listed below:

- Depletion of groundwater resources due to well drilling and completions.
- Accidental spills of hydrocarbons, fuels, or chemical additives used in the well drilling and completion process on the surface. Spills from surface activities would pose the highest risk to shallower groundwater because deeper aquifers would generally be hydraulically isolated.
- Subsurface contamination of groundwater from drilling and completion. Effects could occur through loss of well integrity due to breaches in mechanical, physical, and engineered barriers designed to direct or contain subsurface fluids in drilling or completion operations of the wells.

Aquifers that could be at risk from contamination are *Underground Sources of Drinking Water* under the Safe Drinking Water Act. *Underground Sources of Drinking Water* is defined by the EPA as "an aquifer or portion of an aquifer that

- supplies any public water system or that contains a sufficient quantity of ground water to supply a public water system; and
- currently supplies drinking water for human consumption; or
- contains fewer than 10,000 milligrams per liter total dissolved solids and is not an exempted aquifer." (EPA 2016)

Public concern about the use of hydraulic fracturing has been focused on the potential for contamination of freshwater aquifers and impacts to domestic and municipal water supplies. Hydraulic fracturing would be conducted to stimulate the hydrocarbon-bearing formation, creating additional pathways to facilitate hydrocarbon production. Agents called "proppants" (typically sand, aluminum, glass, or plastic beads with less than 1% of other compounds) are mixed with fresh water or produced water and then pumped into the producing formation with sufficient hydraulic pressure to create secondary porosity fractures. The proppants then prop open the secondary porosity fractures to facilitate gas and fluid movement to the borehole. Following completion of hydraulic fracturing activities, the pressure differential between the formation due to the overlying bedrock and the borehole that connects with the surface causes most of the injected fluids to flow toward the borehole and then upward to the surface along with the hydrocarbon fluids released from the formation. The composition of this mixture, called flowback water, gradually shifts over a period of several days to a few months as injected fluids that have not yet migrated back to the wellbore or that have reacted with the native rock are carried out of the formation.

When hydraulic fracturing of oil and gas wells drilled to access federal fluid minerals or for accessing private fluid minerals from federal surface lands is properly implemented, it does not represent a significant adverse impact to human health and the environment. BLM Onshore Order No. 2 (53 *Federal Register* 46798) and New Mexico Administrative Code 19.15.16.10 are operational rules and contain specific requirements for casing and cementing and well integrity.

In addition to the vertical separation of the upper extent of fractures and freshwater aquifers, the BLM (BLM Onshore Order No. 2) and the New Mexico Oil Conservation Division (New Mexico Administrative Code 19.15.16.10) require the proper casing and cementing of wellbores to isolate aquifers penetrated by a wellbore. The depth of casings is based on a geological review of the formations, aquifers, and groundwater. Cement is pumped into the space between the casing and surrounding rock to prevent fluids from moving up the wellbore and casing annulus and coming in contact with shallow rock layers, including freshwater aquifers. BLM petroleum engineers review well and cement design and final drilling and cementing logs to ensure that the cement has been properly placed. When penetration of groundwater and freshwater aquifers is anticipated, BLM inspectors may witness the cementing of surface casing and subsequent pressure testing to ensure that the annular space between the casing and borehole wall is properly sealed.

The CFO RMP also includes several fluid minerals lease stipulations that would help prevent potential impacts to groundwater and other water resources. These stipulations can be found in Appendix C, and include the following stipulations:

- C-3 (Controlled Surface Use Stipulation – Domestic Freshwater Wells and Monitoring Wells)
- C-3A (0.25-mile buffer around riparian areas, perennial springs, and seeps prohibiting placement of oil, tank bottoms, or other hydrocarbons, salt water, or any toxic substances)
- C-4 (Controlled Surface Use Stipulation – Riparian-wetland and Aquatic Areas)
- C-8 (Lease Notice – Potential Cave or Karst Occurrence Area)
- C-34 (Controlled Surface Use Stipulation – City of Carlsbad Capitan Water Supply Field)
- C-37 (Controlled Surface Use Stipulation – Recharge Areas for the Capitan Aquifer West of the Pecos River)

Potential impacts to groundwater resources from the proposed development would include contamination of the groundwater with produced water, drilling mud, and petroleum constituents. With proper construction practices, drilling practices, and BMPs, no significant adverse impact to groundwater aquifers is anticipated to result from future oil and gas development. Potential impacts associated with hydraulic fracturing would be analyzed in more site-specific detail at the APD stage.

Surface disturbance from the various minerals management actions would have similar impacts to soil and water resources, and all are analyzed as one category of impact: by analysis of management action acreages for the three mineral categories: 1) leasable, 2) salable, and 3) locatable (Table 4-7–Table 4-10). Note the differences in total acreages across all alternatives are small, so overall there would not be much difference in the impacts of minerals management actions on soils and water resources across the various alternatives.

The potential for induced seismicity resulting from underground injection of waste water and hydraulic fracturing is another concern. Currently, the USGS is conducting a hazards assessment to determine the magnitude of the induced seismicity and how to address the risk where injection of waste water from oil and gas operations is suspected as the cause of increasingly frequent earthquakes in the mid-continent and other selected areas of the United States. As the USGS continues to research the problem, it may be possible to better define the hazard within a given local area where oil and gas activities are taking place.

Regarding induced seismicity and hydraulic fracturing, the National Research Council maintains that injection of waste water poses more potential concern while hydraulic fracturing as presently conducted for production of hydrocarbons from shale poses only a slight risk (Dillon and Clarke 2015).

Although hydraulic fracturing is a source of induced seismicity in the strict definition of the term, the magnitude of induced seismicity due to hydraulic fracturing is quite small and is referred to as “micro-seismicity.” Oil and gas operators and oilfield hydraulic fracturing service companies use micro-seismicity to measure and monitor the direction and growth of fractures in order to assess the efficiency and efficacy of fracturing operations. Thousands of measurements from various shale gas basins indicated that the magnitudes are typically less than -2.5 and average -3.0 (Warpinski et al. 2012). Magnitudes of 1.0 or less are not felt by people so typical induced seismicity generated by hydraulic fracturing would not be perceived (Maxwell 2013).

Table 4-7. Number of Predicted Wells, Total Predicted Surface Disturbance, and Total Predicted Water Use by Alternative on BLM-administered Lands

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Number of predicted wells on **BLM-administered lands only**	5,874	4,465	3,538	5,832	6,044
Total predicted surface disturbance/acres on **BLM-administered lands after reclamation**	8,636	6,565	5,202	8,575	8,887
Total predicted water use from wells on BLM-administered lands (acre-feet)	***38,811***	***29,503***	***23,379***	***38,538***	***39,937***

Table 4-8. Acreage Opened and Closed to Leasable Mineral Management Decisions by Alternative for BLM Lands

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
BLM Surface Lands					
Open with standard terms and conditions	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Open with moderate constraints (CSU)	956,410	799,649	449,759	786,381	631,634
Open with major constraints (NSO)	54,602	80,394	162,013	158,401	70,142
Closed	174,391	761,404	1,082,972	88,502	84,687
Total	***2,784,273***	***2,784,248***	***2,784,224***	***2,784,058***	***2,784,145***
% of planning area surface lands proposed as closed	***6.3%***	***27.3%***	***38.9 %***	***3.2%***	***3.0%***

Table 4-9. Acreage Opened and Closed to Salable Mineral Management Decisions by Alternative for BLM Lands

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
BLM Surface Lands					
Open	2,637,465	1,160,064	1,121,118	1,784,431	2,028,324
Open with special terms and conditions	–	1,062,192	726,270	752,286	602,621
Closed	146,568	561,995	936,799	247,323	153,174
Total	***2,784,033***	***2,784,251***	***2,784,186***	***2,784,041***	***2,784,119***
% of planning area surface lands proposed as closed	***5.3%***	***20.2%***	***33.6%***	***8.9%***	***5.5%***

Table 4-10. Acreage Opened and Closed to Locatable Mineral Management Decisions by Alternative for BLM Lands

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
BLM Surface Lands					
Open to mineral entry	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
Recommended (or previously recommended for withdrawal)	32,374	380,990	673,996	132,249	122,444
Total*	***2,784,229***	***2,784,105***	***2,784,094***	***2,784,104***	***2,784,149***
% of planning area surface lands recommended for withdrawal	***1.2%***	***13.7%***	***24.2%***	***4.8%***	***4.4%***

*Total may not sum correctly due to rounding

Impacts from the No Action Alternative

Under the No Action Alternative, approximately 5,874 wells and 8,636 acres of surface disturbance are predicted after reclamation and 38,811 of water use in acre-feet (see Table 4-7). Approximately 6.3% of the total planning area would be closed to leasable development, 5.3% to salable development, and approximately 1.2 % withdrawn from mineral development.

Adverse impacts to soil and water resources, as those described above, would be expected to continue if the No Action Alternative is adopted.

Impacts from Alternative A

Under Alternative A, 4,465 wells and approximately 6,565 acres of surface disturbance are predicted on all BLM-administered lands after reclamation. Total predicted water use would be 29,503 acre-feet. A total of 27.3% of the entire planning area would be closed to leasable mineral development, 20.2% closed to salable, and 13.7% recommended for withdrawal from locatables (see Table 4-9).

Compared to the No Action Alternative, surface disturbance would decrease by 2,071 acres and predicted water use by 9,308 acre-feet under Alternative A. Therefore, the magnitude of adverse impacts (as those described above) to soil and water resources would be greater under the No Action Alternative than under Alternative A.

Impacts from Alternative B

Under Alternative B, 3,538 wells and approximately 5,202 acres of surface disturbance are predicted on BLM-administered lands. Total predicted water use would be 23,379 acre-feet. Approximately 38.9% of the entire planning area would be closed to leasable mineral development, 33.6% closed to salable, and 24.2% recommended for withdrawal from locatables.

Compared to the No Action Alternative, surface disturbance would decrease by 3,434 acres and predicted water use by 15,432 acre-feet under Alternative B. Therefore, the magnitude of adverse impacts (as those described above) to soil and water resources would be greater under the No Action Alternative than under Alternative B.

Impacts from Alternative C

Under Alternative C, 5,832 wells and approximately 8,575 acres of surface disturbance are predicted on BLM-administered lands. Total predicted water use would be 38,538 acre-feet. A total of 3.2% of the entire planning area would be closed to leasable mineral development, 8.9% closed to salable, and 4.8% recommended for withdrawal from locatables.

Compared to the No Action Alternative, surface disturbance would decrease by 61 acres and predicted water use by 273 acre-feet under Alternative C. Therefore, the magnitude of adverse impacts (as those described above) to soil and water resources would be slightly greater under the No Action Alternative than under Alternative C.

Impacts from Alternative D

Under Alternative D, 6,044 wells and approximately 8,887 acres of surface disturbance are predicted on BLM-administered lands. Total predicted water use would be 39,937 acre-feet. Only 3.0% of the entire planning area would be closed to leasable mineral development, 5.5% closed to salables, and 4.4% recommended for withdraw from locatables.

When compared to the No Action Alternative, surface disturbance would be 251 acres greater under Alternative D. Predicted water use is also slightly greater (an increase of 1,126 acre-feet) under this alternative compared to the No Action Alternative; therefore, the magnitude of adverse impacts to soil and water resources would be greater under Alternative D compared to the No Action Alternative.

4.2.1.2.9 Impacts of Renewable Energy on Soil and Water Resources

Adverse impacts to soil and water resources would potentially occur in those areas where renewable energy projects that include surface-disturbing activities are allowed. Solar projects would result in direct removal of vegetation created by solar panels. This would have adverse impacts on soil resources, such as erosion and decreased soil productivity. Additionally, some solar projects would require substantial water resources, which would impact water availability for other resources, as well as potentially degrading water quality. Desert aquifers, springs, seeps, and other water bodies would be adversely impacted as water is extracted to meet the needs of cooling and cleaning solar systems. Wind energy, comprising the placement of wind turbines, would also result in surface disturbances that would adversely impact soil and water resources. Impacts associated with surface-disturbing activities would include direct soil compaction, erosion, decreased soil productivity, potential contaminant delivery to water bodies, and alterations in stream hydrology.

Impacts from Management Common to All

Adoption of programmatic policies and BMPs in both the Solar Energy Development Programmatic EIS Record of Decision (ROD) (BLM 2012a) and decisions from the Final Wind Energy Development Programmatic EIS (BLM 2005) when implemented would also potentially minimize adverse impacts to soil and water resources across the planning area.

Impacts from Management Common to All Action Alternatives

All action alternatives encourage the placement of wind development projects in areas where transmission corridors are already located and where transmission systems are already in place.

As a result, adverse impacts to soil and water resources, as those described at the beginning of this section, would be greatly minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, the BLM would exclude 1,819,929 acres from geothermal and solar development projects and 7,056 acres from wind development projects. Restrictions on the location of solar or wind energy sites would continue to be implemented on specific sites across the planning area, with the majority of the planning area excluded for solar development, as identified by the Solar Energy Development Programmatic EIS ROD (BLM 2012a). Those sites restricted from wind development projects include WSAs, WSRs, VRM Class I and II areas, and areas with known karst occurrences (for complete list of restrictions, see Chapter 2, Alternatives Matrix). Wind energy development would be restricted in designated SMAs to protect sensitive soils. In addition, applications to permit either solar or wind energy sites on public land within the planning area would be considered only if the applicant can demonstrate no negative impacts on avian and bat species. All of these management prescriptions would benefit soil and water resources by minimizing surface disturbance and its associated adverse impacts, as those described above.

Impacts from Alternative A

Under Alternative A, the BLM would close or exclude approximately 624,734 acres from wind development, approximately 768,020 acres from solar, and 995,285 acres from geothermal development. Solar, wind, and geothermal development would be excluded in areas with sensitive soils, not only in SMAs as is the case under the No Action Alternative.

Compared to the No Action Alternative, the magnitude of beneficial impacts to soil and water resources would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative. Though the No Action Alternative prohibits solar development projects on a larger number of acres, the Solar Energy Development Programmatic EIS ROD (BLM 2012a) states most of the planning area would not be suitable to support solar development, thus greater number of acres closed to solar development is irrelevant.

Impacts from Alternative B

Under Alternative B, the BLM would exclude approximately 912,860 acres from wind development. Approximately 833,305 acres would be excluded from solar and 1,372,791 acres would be closed to geothermal development. Solar, wind, and geothermal development would be excluded in all areas with sensitive soils.

Compared to the No Action Alternative, the magnitude of beneficial impacts to soil and water resources would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative.

Impacts from Alternatives C and D

Under Alternative C, the BLM would exclude approximately 206,184 acres from wind development. Approximately 734,636 acres would be excluded from solar and 608,850 acres would be closed to geothermal development.

Under Alternative D, 73,143 acres would be excluded from wind development. Under Alternative D, approximately 630,302 acres would be excluded from solar and 464,187 acres would be closed to geothermal development. Wind and geothermal development would be avoided in areas with sensitive soils while solar development would be excluded.

Compared to the No Action Alternative, the magnitude of beneficial impacts to soil and water resources would be potentially greater because all sensitive soils would be avoided, and wind development would be prohibited on a substantially larger number of acres under this alternative.

4.2.1.2.10 Impacts of Visual Resources on Soil and Water Resources

VRM class designations have specific management objectives that, depending on the class designated, could beneficially impact soil and water resources. The objectives defined for VRM Class I and II include the preservation or retention of the existing character of the landscape and, therefore, minimize and at times prohibit surface-disturbing activities. Those impacts to soil and water resources associated with mineral development, ROW construction and maintenance, and other land use authorizations and road and trail construction would be minimized, and in some cases prohibited, within these VRM Class I and II designations.

Various impacts on soil and water resources associated with ground-disturbing activities include alterations to stream hydrology and subsurface drainage patterns, disruptions in surface vegetative communities resulting in decreased soil productivity, soil compaction, sediment loading, and an increased potential for contamination of groundwater.

The number of acres designated as VRM Class I and II vary across the alternatives and are depicted in Table 4-11.

Table 4-11. Visual Resource Management Decisions (acres) by Alternative

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***50,671***	***273,710***	***357,802***	***67,962***	***48,263***

Impacts from the No Action Alternative

Under the No Action Alternative, 50,671 acres would be designated under either VRM Class I or II (see Table 4-11). Soil and water resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres.

Impacts from Alternative A

Under Alternative A, 273,710 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impacts would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designations.

Impacts from Alternative B

Under Alternative B, 357,802 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impacts would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designations.

Impacts from Alternative C

Under Alternative C, 67,962 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative due to the increase in the number of acres under the VRM Class I and II designations.

Impacts from Alternative D

Under Alternative D, 48,263 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative due to the increase in the number of acres under the VRM Class I and II designations.

4.2.1.2.11 Impacts of Wildland Fire and Fuels Management Actions on Soil and Water Resources

Soil conditions are critical to overall ecosystem productivity. Impacts from wildland fire and fuels management on soils and water resources would be largely associated with wildland fire and prescribed fire use, as well as hazardous fuels reduction treatments. Wildland fire can protect, maintain, and enhance resources, but at the same time has the potential to alter the physical, chemical, and biological characteristics of soil due to the transfer of heat. These impacts can in turn increase erodibility through the breakdown soil structure, reduction of soil moisture retention ability and capacity, and the reduction of infiltration and percolation, leading to the development of hydrophobic (i.e., water-repellent) soils (Neary et al. 2008).

Soil conditions also influence the overall hydrological processes that affect watershed conditions, including surface and groundwater, and quality of these water sources. Vegetation cover is the primary component preventing erosion of surface soils (Neary and Folliott 2008). Wildland fire and prescribed fire use result in the loss of vegetation, thereby increasing soil erosion from wind and/or water and potentially leading to the deposition of eroded sediment into streams and other water bodies.

Non-fire treatment methods (mechanical removal, chemical and biological treatments, manual removal, seeding) would facilitate restoration and lessen the potential for future catastrophic wildfire. This in turn would reduce future impacts to soil and water resources resulting from soil alteration and loss of vegetative cover. Mechanical treatments to reduce fuels would also result in a loss of vegetation, but to a lesser degree than fire use because mechanical extraction often leaves the understory intact and does not alter soil characteristics like heat transfer during fire events. Chemical and biological treatments would retain vegetation cover and minimize erosion; however, the chemicals could migrate into water bodies through runoff or wind erosion. Emergency stabilization, rehabilitation, and restoration efforts would be implemented following wildland fire and prescribed fire use for erosion control and revegetation, which would minimize impacts to water resources.

4.2.1.2.12 Impacts of Vegetative Management Actions on Soil and Water Resources

Aside from impacts from mechanical and chemical methods, and wildland fire use described above, other vegetation management actions, common to all alternatives, that would impact soil and water resources include restoration efforts to improve or maintain the vegetative communities. Removal of woody vegetation could result in short-term adverse impacts from soil erosion; however, increased grass cover would be beneficial in the long term. Overall, these management actions—including site-specific seed mixtures, planting of trees and shrubs, and improvement of the surface vegetative community—would benefit soils and water resources by enhancing soil stability against water and wind erosion, and improving the physical function of soils.

4.2.2 Karst Resources

This section addresses the impacts to karst resources from management actions discussed in Chapter 2. Existing conditions concerning karst resources across the planning area are described in Section 3.2.3.

Actions that disturb or degrade karst resources or disrupt the habitat of flora or fauna that utilize caves and other karst features are considered adverse. Actions that avoid or prevent adverse impacts are considered beneficial. Risks to karst resources would result from any activities associated with surface and/or subsurface disturbance, particularly those within critical karst resource zones and zones of high karst potential occurrence. As stated in Section 3.2.3, Cave/Karst Resources, the planning area contains approximately 1 million acres of karst terrain and has documented over a thousand karst features to date. The high probability of encountering karst features makes early detection and prevention of utmost importance in protecting karst resources.

4.2.2.1 Analysis Methods

The analyses of impacts to karst resources under the alternatives are a result of the review of various publications relevant to the karst topography of the planning area, a review of documents associated with current karst resource management across BLM-administered lands, resource monitoring and resource projects and observations conducted by field office staff, and also through coordination with BLM team members.

4.2.2.1.1 Indicators

Section 3.2.3, Cave/Karst Resources, identifies several indicators by which the condition of karst resources may be determined: quality and quantity of associated groundwater, health of associated riparian zones, data on human visitation to recreational caves numbers and health of cave-associated biological communities. Although data associated with each of these potential indicators have been collected and recorded by the BLM and/or other sources, these data are not comprehensive. Therefore, the following quantitative indicator was used for the analysis of management impacts:

- Number of acres impacted by management actions resulting in surface and/or subsurface disturbances across karst landscapes.

4.2.2.1.2 Methods and Assumptions

Management actions associated with the following resources and land uses may result in impacts to karst resources and are discussed in detail below: karst resources, cultural and paleontological resources, wildland fire management, land use authorizations, mineral development, livestock grazing, lands with wilderness characteristics, vegetation, soils and noxious weeds, fish and wildlife, recreation, riparian and other water sources, special designations, visual resources and renewable energy. Actions associated with the following resources do not impact karst because they do not include surface- or subsurface-disturbing activities: air resources, health and safety, land tenure, and special status species.

The assumptions considered for analysis include the following:

- Oil and gas development would increase across karst landscapes over the next 20 years. Given the vast amount of karst topography across the planning area, currently unknown caves and other subsurface voids are very likely to be detected and/or encountered across critical karst resource zones and zones of high and medium karst potential occurrence. As such, the karst potential map boundaries may be adjusted accordingly.
- Newly discovered caves across the planning area would be managed as "significant," as defined by the Federal Cave Resources Protection Act (FCRPA) of 1988, until further examination is conducted to determine whether significance designation is warranted.
- Visitation to caves not requiring an entry permit would most likely increase over the next 20 years as populations grow and more people are introduced to recreational caving. As a result, adverse impacts to karst resources would potentially increase.
- Speleological research is expected to increase particularly in the microbiological and paleoclimate fields. This is due to recent discoveries and the role that extreme cave environments play in those fields.

4.2.2.2 Direct and Indirect Impacts

Both direct and indirect impacts to karst resources occur primarily as the result of surface- and subsurface-disturbing activities over karst landscapes. Of immediate concern is the potential associated with mineral development for contamination and degradation of groundwater, seeps, springs, and freshwater aquifers, some of which, like the Capitan Aquifer, serve as a major source of drinking water and are recharged through the expedited movement of surface water through karst features (potential impacts to karst resources associated with oil and gas leases and salable and locatable minerals are discussed in greater detail below in the Minerals section 4.3.1).

Surface disturbances associated with other activities such as ROW construction and livestock grazing may also have direct impacts of varying magnitude to karst resources, including alterations in surface drainage routes as a result of soil compaction and excessive sedimentation. This can act as a plug to natural small sinkholes and other drainage features. Other direct impacts may include contamination of the subsurface environment from spills, ruptured or leaking pipes. Indirect impacts to the subsurface environment may also result. These would include potential disruptions of airflow and water flow patterns within caves and other underground voids, as well as disturbances to faunal communities, including rare, cave-adapted species that have very specific temperature and humidity requirements (U.S. Fish and Wildlife Service [USFWS] 2011).

4.2.2.2.1 Impacts of Karst Resource Actions on Karst Resources

Chapter 2 identifies management actions specifically designed to protect karst resources from surface and subsurface disturbances, primarily related to mineral development activities. Preventative measures listed in Chapter 2, including prescriptions addressing early karst feature detection and avoidance, are important for reducing the risk of subsurface impacts, such as migration of pollutants through the karst system and subsequent groundwater contamination, alteration of subsurface drainage patterns, and disruption of cave biological communities. Of particular importance to karst ecosystems are the surface communities surrounding cave entrances. Nutrients are brought into this system either from surface organic material, such as leaf litter, root masses, or through species that obtain their nutrients from the surface but also utilize the cave environment for other food resources, moisture, and shelter. Impacts to surface communities could adversely affect the sensitive balance within the karst ecosystem and indirectly place some species at risk of displacement, including rare, cave-adapted species, some of which are currently undescribed and known only from one locality (Cokendolpher and Polyak 1996; Goodbar 2012).

Karst resources would be at greater risk of adverse impacts, resulting from surface and subsurface disturbances, in areas across the planning area that have a higher frequency of karst development and features present. As discussed in Chapter 3, three categories of karst potential occurrence have been delineated by the CFO across the planning area in order to indicate the likelihood of encountering karst features. These zones of karst potential occurrence are categorized as: high, medium and low. In addition, highly hydrologically important critical karst resource zones have been delineated and occur within zones

of high karst potential occurrence. These highly important resource areas assist in the rapid recharge of karst groundwater aquifers from surface runoff and help provide critical drinking water to major communities and springs that support rivers and important riparian habitats. Table 4-12 represents the number of acres within zones of high and medium karst potential occurrence as well as the number of acres designated as critical karst resource zones across the planning area.

Table 4-12. Karst Potential Occurrence and Karst Critical Resource Zones (acres)

Type	Acres	Percent of Planning Area
Critical*	242,231	9
High	628,576	23
Medium	1,006,452	36
Low	1,148,705	41

Note. Karst critical resource zones are all located within zones of high karst potential occurrence.

Impacts from Management Common to All

Management actions common to all alternatives require environmental protection measures for all karst terrain within the planning area. This includes adherence to the BLM's Instructional Memorandum (IM) for guidance in cave closures and decontamination for prevention of the spread of white-nose syndrome and also applicant commitment to management prescriptions outlined in the HB Solution Mining ROD (BLM 2012b). These prescriptions reduce the risk of surface and subsurface disturbances across karst terrain through preventative measures, such as early karst feature detection, and include coordination with the BLM on final layout of all facilities and pipelines within zones of high karst potential occurrence and the requirement that any facilities potentially crossing any major karst features, as defined by BLM staff, will need to be relocated or modified before final construction approval is granted.

Other preventative measures specifically aimed at reducing the risk of adverse impacts to karst resources through early feature detection include compilation of data by BLM staff on already drilled wells to categorize, for example, lost-circulation zones and lowest likely depth at which caves or other karst features may be encountered. In addition, a map depicting high, medium, and low zones of karst potential occurrence, as well as critical karst resource zones integral to groundwater recharge, will serve as a reference for evaluating locations of proposed activities. Required karst field surveys, an essential component of accurate karst feature identification (Stafford 2008), and thorough review of BLM records of karst features in the area of interest will contribute to greater precision in feature detection and, therefore, minimize the potential for surface and subsurface disturbances in areas with karst resources present.

Under all of the alternatives, if a karst feature is detected, avoidance will be considered the primary method for mitigating potential impacts. Avoidance will be accomplished through the relocation or modification of the proposed project.

Karst resources throughout the planning area will continue to be managed under stipulations and COAs required for all mineral exploration, production, and reclamation within BLM-administered lands (see Appendix O for Practices for Oil and Gas Drilling and Operations in Cave and Karst Areas and Appendix C for Fluid Mineral Lease Stipulations). Additionally, the following current cave management plans will continue to be followed; McKittrick Hill Cave Management Plan, Fence Canyon Cave Management Plan, KFFC Cave Management Plan, Yellowjacket Cave Management Plan, Lonesome Ridge Management Plan, Chosa Draw ACEC Management Plan, Dark Canyon ACEC/SMA Management Plan, Manhole Cave Management Plan, Lost Cave Management Plan, and the Boyd's Cave Management Plan.

Impacts from Management Common to All Action Alternatives

All action alternatives require the development of a karst resources management plan for those significant caves that are not covered by other activity or ACEC plans. There are currently more than 500 caves designated as significant across BLM-administered lands within the planning area. Through the development of a broad-based plan covering all caves, scientific, educational, and aesthetic resources that may be unique to these caves would be recognized and considered when compiling management

objectives and prescriptions. Additionally, all action alternatives would require a 984-foot buffer around all known karst features. Compared to the No Action Alternative, these buffer zones would qualitatively increase beneficial impacts under all action alternatives because the buffer around all know karst features would increase by 328 feet.

Under Management Common To All Action Alternatives, the risk of potential impacts associated with drilling activities, such as migration of drilling fluids, oil, gas, and brine into cave systems, and contamination and degradation of groundwater and important recharge areas, would be reduced through the requirement of four-string casings of a high-grade steel cemented externally all the way to the surface on all projects within critical karst resource zones and three-string casings in zones of high karst potential occurrence. See Appendix L – Implementation Level Decisions.

Impacts from the No Action Alternative

The 1997 Carlsbad RMP Amendment included a management prescription stating “surface disturbance will not be allowed within up to 656 feet of known cave entrances, passages or aspects of significant caves, or significant karst features” (BLM 1997:APl-3). This wording left room for interpretation that was not consistent with the original intent and, therefore resulted in surface disturbances inside the 656-foot buffer around some karst features across the planning area. As a result, the No Action Alternative for this revised RMP will reflect the original intent of the 656-foot surface buffer management prescription, which prohibits all surface-disturbing activities within the entire 656-foot buffer surrounding karst features across the planning area.

Under the No Action Alternative, a 656-foot buffer would be placed around all known karst features, including cave entrances, passages, or aspects of significant caves. All surface-disturbing activities would be prohibited within this buffer, thereby reducing the risk of disturbances to the subsurface karst environment. There are approximately 1,000 documented karst features across the planning area, each of which is subject to the 656-foot surface disturbance buffer under the No Action Alternative.

The 656-foot surface disturbance buffer would also provide beneficial impacts to cave fauna by protecting a portion of the surrounding surface community. As mentioned previously, this is particularly important for cave ecosystems because all nutrient input within these systems is a result of the plants and animals inhabiting the surface.

Under this alternative, in zones of medium karst potential occurrence, the requirement of a third-party karst field survey would be at the discretion of the BLM. Although professional karst surveys are not required, a general site examination is conducted by BLM personnel. Though not a specific karst survey, these field examinations do result in the recording of any karst features encountered. Nonetheless, karst features that are in fact present within the area of interest may go undetected due to the absence of specific karst field surveys, resulting in greater risk to karst resources.

Impacts from Alternatives A and B

Under Alternatives A and B, BLM would work to attain no net loss of BLM lands within high and medium karst occurrence zones due to BLM-authorized activities. To attain no net loss, the BLM would avoid, minimize, rectify, reduce, or eliminate impacts over time, and compensate for remaining unavoidable impacts. Compensatory site mitigation would go to areas such as NSO, ACECs, and sensitive groundwater recharge areas. Compared to the No Action Alternative, which has no similar compensatory site mitigation for high and medium karst occurrence zones, beneficial impacts to karst resources would be greater under Alternatives A and B.

Impacts from Alternative C

Under Alternative C, BLM would work to attain no net loss of BLM lands within high karst occurrence zones due to BLM-authorized activities. To attain no net loss, the BLM would minimize, rectify, reduce, or eliminate impacts over time, and compensate for remaining unavoidable impacts. Compensatory site mitigation would go to areas such as NSO, ACECs, and sensitive groundwater recharge areas.

Compared to the No Action Alternative, which has no similar compensatory site mitigation for high karst occurrence zones, beneficial impacts to karst resources would be greater under Alternative C.

Impacts from Alternative D

Under Alternative D, BLM would work to attain no net loss of BLM lands in karst ACECs due to BLM-authorized activities. To attain no net loss, the BLM would minimize, rectify, reduce, or eliminate impacts over time, and compensate for remaining unavoidable impacts. Compensatory site mitigation would go to areas such as NSO, ACECs, and sensitive groundwater recharge areas. Compared to the No Action Alternative, which has no similar compensatory site mitigation for lands in karst ACECs, beneficial impacts to karst resources would be greater under Alternative D.

4.2.2.2.2 Impacts of Fish and Wildlife Actions on Karst Resources

Fish and wildlife management actions would indirectly benefit karst resources if the presence of species habitat occurs in caves or other karst features and/or is within areas containing karst features, particularly across the zones of critical and high karst potential occurrence. Actions associated with fish and other wildlife that utilize water would provide additional indirect benefits to karst resources through improved water quality management prescriptions.

Impacts from Management Common to All

Karst resources would potentially benefit from any management common to all actions if karst features were present near floodplains, wetlands, and/or river systems that were actively managed for preservation, protection, and restoration purposes, as required by Executive Orders (EOs) 11988 and 11990 and BLM policy.

Stipulations contained in Appendix C provide for a 1,312-foot surface disturbance buffer around all caves with active bat roosts. For those caves, this would contribute to a greater protection of the surface community and, subsequently, the subsurface environment compared to the standard cave-karst buffers.

In addition, those karst features that fall within Phantom Banks Heronries and other areas managed specifically for habitat improvement projects would benefit from minimized surface disturbance and subsequent impacts to the subsurface environment. Karst features may also receive some benefits from a 1,312-foot buffer prohibiting surface-disturbing activity if located near trees with active raptors nests.

Impacts from Management Common to All Action Alternatives

There are no proposed fish and wildlife decisions under Management Common to All Action Alternatives that would impact karst resources because none of the actions address surface-disturbing activities with the exception of seasonal surface-disturbing restrictions around active heronries.

4.2.2.2.3 Impacts of Lands with Wilderness Characteristics Actions on Karst Resources

Those karst resources located within lands managed to protect wilderness characteristics would receive beneficial impacts as a result of additional management prescriptions aimed at further minimizing surface disturbances. The greater the number of acres managed to protect lands with wilderness characteristics, the greater the benefit to karst resources, particularly in those lands with wilderness characteristics that occur across zones of high and medium karst potential occurrence. Those sections designated as critical karst resource zones contain hydrologically important karst features and occur within zones of high karst potential occurrence.

When lands with wilderness characteristic units are managed to emphasize multiple uses while applying some protective management (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics, there would be some long-term benefits to karst resources, but it would depend on the prescriptions for the individual units. See Section 4.2.9 Lands with Wilderness Characteristics for details. For this reason, the greater the number of acres managed to protect wilderness characteristics, the greater the protections afforded to karst resources. Where lands with wilderness characteristics units are managed to emphasize other multiple uses as a priority over protecting wilderness characteristics, ground-disturbing activities such as minerals development may still be allowed and would offer less protection to karst resources.

The acreages of zones with high and medium karst potential occurrence and also critical karst resource zones within proposed lands with wilderness characteristics vary by each alternative and are represented in Table 4-13.

Table 4-13. Number of Acres of High and Medium Karst Potential Occurrence and Acres of Critical Resource Zones within Lands Managed to Protect Wilderness Characteristics under Each Alternative

Karst Potential Occurrence	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
High	*N/A	13,391	13,300	5,119	1,221
Medium	*N/A	53,169	34,206	0	0
Critical karst resource zones	*N/A	3,134	3,043	5,119	1,221

*There would be no units managed as lands with wilderness characteristics under the No Action Alternative.

Impacts from Management Common to All

There are no decisions listed under management common to all.

Impacts from Management Common to All Action Alternatives

Beneficial impacts to karst resources from Management Common to All Action Alternatives would include a reduction in erosion and compaction, and less likely occurrence of contamination and alterations to surface drainage basins and water infiltration routes. Karst resources occurring on lands managed to protect wilderness characteristics would receive indirect positive impacts as a result of applicable management prescriptions, including closure to leasing or NSO stipulations; restrictions on the construction of new roads, structures, and facilities not related to the preservation and enhancement of wilderness characteristics; and vehicular use limited to designated routes only. All management prescriptions would beneficially impact karst resources.

Impacts from the No Action Alternative

Under the No Action Alternative, karst resources would not receive any beneficial impacts, because no lands would be managed as lands with wilderness characteristics and, therefore, no karst resources would benefit from management prescriptions, as described above, specific to designated lands with wilderness characteristics.

Impacts from Alternative A

Under this alternative, 13,391 acres in the high karst potential occurrence zone would be protected under lands with wilderness characteristics management prescriptions. A total of 3,134 of these acres is designated as a critical karst resource zone. Additionally, 53,169 acres in medium karst potential occurrence zone would be protected. A total of 66,666 acres would benefit from management prescriptions described above compared to the 0 acres classified under lands with wilderness characteristics proposed in the No Action Alternative.

Impacts from Alternative B

Under Alternative B, a total of 13,300 acres in high karst potential occurrence zone would be protected under lands with wilderness characteristics management prescriptions. A total of 3,043 of these acres is designated as a critical karst resource zone. An additional 34,206 acres in medium karst potential occurrence would be protected. Approximately 47,611 acres would benefit from management prescriptions described above compared to the 0 acres classified under lands with wilderness characteristics proposed in the No Action Alternative. An additional 18,964 acres would be managed to emphasize other multiple uses while applying some protective management.

Impacts from Alternative C

Under Alternative C, 5,119 acres in the high karst potential occurrence zone, all of which fall within critical karst resource zones, would be protected under lands with wilderness characteristics management prescriptions. Zero acres in medium karst potential occurrence would be protected. Approximately 5,119 acres would benefit from management prescriptions described above compared to the 0 acres classified under lands with wilderness characteristics proposed in the No Action Alternative. Approximately 30,595 acres would be managed to emphasize other multiple uses while applying some protective management, and 30,862 acres would be managed to emphasize other multiple uses. Alternative C would offer more protections to karst resources as compared to the No Action Alternative but less than Alternatives A and B.

Impacts from Alternative D

Alternative D would manage 1,221 acres to protect wilderness characteristics, the least number of acres for lands with wilderness characteristics designation within critical, high, and medium karst potential occurrence zones and, therefore, would be the least beneficial to karst resources after the No Action Alternative. Zero acres would be managed to emphasize other multiple uses while applying some protective management, and 65,446 acres would be managed to emphasize other multiple uses. Alternative D would offer the least amount of protections to karst resources as compared to the No Action Alternative.

4.2.2.2.4 Impacts of Paleontological and Cultural Resources Actions on Karst Resources

Beneficial indirect impacts to karst resources would occur if the presence of paleontological or cultural resources occurred within caves or other areas containing karst features that lead to restrictions on surface disturbance. Most of the caves containing paleontological resources across the planning area are gated, which greatly negates the potential for adverse impacts to cave resources as a result of illegal entry.

Boyd's Cave, an important cultural resource considered sacred to the Mescalero Tribe and tribal members, is designated under the Cave Resources ACEC and is further discussed in the Special Designations section below (Section 4.4).

Impacts from Management Common to All

There are no management common to all decisions for paleontological or cultural resources.

Impacts from Management Common to All Action Alternatives

Karst features that fall within the boundaries of archeological districts would benefit from restrictions on the use of surface-disturbing equipment, such as bulldozers and road graders, within these areas. The prohibition of this machinery would reduce the risk of impact to the subsurface environment and minimize disturbances to the surrounding surface community, an integral component in the health of karst ecosystems.

Impacts from the No Action and Action Alternatives

There are no impacts to karst resources from paleontological and cultural proposed decisions listed in all the alternatives.

4.2.2.2.5 Impacts of Vegetative Communities Actions on Karst Resources

Vegetative management actions would indirectly benefit karst resources through the restoration and enhancement of the surface vegetative community around karst features, particularly across zones of critical and high karst potential. A healthy surface vegetative community would beneficially impact karst resources by providing a surface buffer against potential disturbances in temperature and humidity regimes within the cave environment, as well as providing resources for species that use both the cave and the surface for food and shelter. This would have an indirect beneficial impact on all cave fauna, including rare, cave-adapted species.

Impacts from Management Common to All

Under management common to all alternatives, karst resources would benefit indirectly through the general management objectives to improve vegetative composition, cover, and production in areas that currently do not meet vegetation condition objectives, as defined by the BLM Roswell Field Office and adopted by the CFO.

Impacts from Management Common to All Action Alternatives

There would be no impact to karst resources from the Management Common to All Action Alternatives proposed decisions.

Impacts from the No Action and Action Alternatives

There are no impacts to karst resources from proposed vegetative management decisions listed in all of the alternatives.

4.2.2.2.6 Impacts of Noxious Weeds and Invasive Species Actions on Karst Resources

Management prescriptions for the treatment of non-native and invasive species provide beneficial impacts to the surface communities around karst features. Indirect benefits would occur for cave biota, particularly those species that utilize both the surface and cave environment, through an enhanced and healthy surface plant community.

Impacts from Management Common to All

Those karst features located in areas across the planning area that are also under management prescriptions outlined in the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007b) would receive long-term, indirect benefits through a healthy, more diverse surface plant community absent of non-native, invasive species that can potentially out-compete and displace native plant species.

Impacts from Management Common to All Action Alternatives

All action alternatives contain management decisions that would positively benefit karst resources by requiring a 984-foot buffer around all cave/karst resources that would prohibit the application of herbicides. This would provide an indirect beneficial impact to cave/karst resources through protection of the surface vegetative community which may act as a buffer against drastic alterations in temperature and humidity regimes within the cave environment and also provide nutrients to species that use the cave for shelter and food. Additionally, the 984-foot buffer would reduce the potential for herbicide contamination within the subsurface ecosystem.

BMPs aimed at controlling noxious weeds and other non-native species would provide indirect benefits to karst resources through habitat restoration activities and invasive vegetation monitoring. Species within the cave ecosystem would indirectly benefit from these management actions through the maintenance of healthy surface communities and overall improved rangeland health.

Impacts from the No Action Alternative

Under the No Action Alternative, cave entrances would not necessarily be protected from herbicide application, which would adversely affect plant cover and composition directly around the caves and other karst resources. This would potentially affect the cave ecosystem by altering nutrient inputs that enter the cave through the surface.

Impacts from the Action Alternatives

There are no impacts to karst resources from noxious weeds and invasive species decisions listed in these alternatives.

4.2.2.2.7 Impacts of Soil Resources Actions on Karst Resources

Karst resources would benefit from soil management objectives across the planning area that maintain or enhance stability and physical function of soils, particularly in karst-dense gypsum soils. In addition, the surface communities surrounding karst features would benefit through special reclamation procedures of disturbed sites, including special site-specific seed mixtures, the planting of trees and shrubs, erosion control, and land treatments. Karst resources would benefit indirectly from the enhanced surface community, particularly those found in areas with special soil management prescriptions across zones of critical and high karst potential occurrence.

Impacts from Management Common to All

Management common to all decisions would beneficially impact karst resources, as all include BMPs designed specifically to prevent soil erosion and runoff. Some of these would include special site-specific seed mixtures, the removal of caliche and other surface materials, soil amendments, soil treatments, and the planting of trees and shrubs. Runoff from disturbed and destabilized soils would potentially alter surface water infiltration routes into karst features. This would indirectly impact water sources that are important to karst formation. In addition, cave fauna would be potentially affected through disruptions in moisture and humidity requirements.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions for soils under Management Common to All Action Alternatives.

Impacts from the No Action Alternative

Under the No Action Alternative, karst resources would potentially receive adverse impacts as a result of management stipulations that do not place explicit limits on the percentage or acreage on allowable surface disturbance on an oil and gas lease.

In addition, projects may be modified, moved, or mitigated for soil erosion if located on unsuitable areas, defined under this alternative as areas with slopes with grades of 30% or greater.

Impacts from Alternative A

Under Alternative A, future development of ROWs for pipelines, roads, and power lines would be avoided on gypsum soils. This would reduce the risk of both surface and subsurface impacts to karst resources within the karst-dense and hydrologically important gypsum soils.

Additionally, surface disturbance stipulations would be in effect within the entire Southern Gypsum Soil Area (SGSA). Under this alternative, those karst features located within the SGSA would benefit from additional surface protection, as surface disturbances associated with oil and gas leases would not be permitted to exceed 3% of the entire lease acreage or a maximum of 7 acres (whichever is greater). This is of particular importance on these karst-dense and hydrologically important gypsum soils, as they are highly susceptible to erosion and have many exposed karst features that serve as recharge for groundwater.

As in the No Action Alternative, surface disturbances are minimized; however, under Alternative A the magnitude of beneficial impacts is greater because it sets specific requirements for the amount of allowable surface disturbance and prohibits surface occupancy in any areas with slopes at 10% or greater, as opposed to the No Action Alternative, which does not prohibit any surface occupancy. The magnitude of beneficial impacts to karst resources is greatest under this alternative.

Impacts from Alternative B

Under Alternative B, surface disturbances would be limited by stipulations only within specific soil mapping units of the SGSA. As in the No Action Alternative, surface disturbances are minimized; however, under Alternative B the magnitude of beneficial impacts is greater because it sets specific requirements for the amount of allowable surface disturbance within specific soil units and prohibits surface occupancy in any areas with slopes with grades 20% or greater, as opposed to the No Action Alternative which does not prohibit any surface occupancy.

Impacts from Alternative C

Alternative C does not set a percentage or acreage limit on allowable surface disturbance within oil and gas leases, although it does require the use of directional drilling and restrict all new well infrastructure to existing disturbed corridors when applicable. As with Alternative B, Alternative C proposes NSO stipulations in areas with slopes with grades greater than 20%, with the additional requirement of an engineered plan for areas with slopes with grades greater than 10%.

These proposed decisions would provide greater beneficial impacts to karst resources compared to the No Action Alternative, but the magnitude of beneficial impacts would be less here than under Alternatives A and B.

Impacts from Alternative D

Compared to all the other alternatives, Alternative D would have the greatest potential adverse impact to karst resources, with no cap on allowable surface disturbance, no requirements to utilize directional drilling, and a management prescription that would provide the least amount of protection against erosion (avoidance of slopes with grades greater than 30%).

4.2.2.2.8 Impacts of Wildland Fire and Fuels Management Actions on Karst Resources

The surface community provides an important source of nutrients to the cave ecosystem through the input of organic materials washed into the cave and by species that may feed on the surface but also spend a substantial amount of time in the cave for other food sources and shelter (e.g., trogloxenes). As a result, wildland fire and fuels management actions could potentially result in short-term, adverse impacts to karst resources due to initial removal of surface vegetation. These adverse effects would be most prominent in areas of high karst potential designated for saltcedar (*Tamarix* sp.) eradication and/or under prescribed burn management plans. However, these shot-term adverse impacts could ultimately be replaced by long-term beneficial impacts after the surface vegetation regenerates by potentially increasing the nutrient input from the surface community into the cave ecosystem for utilization by trogloxenes and other cave inhabitants.

Impacts from Management Common to All

Management common to all decisions would provide long-term, indirect benefits to karst resources through restoration and enhancement of native plant communities. This would contribute to the overall health of the karst ecosystem through an enhanced vegetative and animal surface community.

Impacts from Management Common to All Action Alternatives

Those karst resources located in saltcedar and other invasive species treatment areas would indirectly benefit from prescribed fire management and fuel loading reduction.

Impacts from the No Action and Action Alternatives

There are no impacts to karst resources from wildland fires and fuels management decisions listed in these alternatives.

4.2.2.2.9 Impacts of Livestock Grazing Actions on Karst Resources

Livestock grazing proposed decisions would potentially impact karst resources if features are located within areas open to grazing, particularly across zones of high and medium karst potential occurrence.

One potential indirect impact would be from fecal contamination of surface water runoff and, consequently, wells, aquifers, and springs (Pasquarell and Boyer 1995), some of which are important municipal and agricultural water sources. Karst resources within the gypsum karst terrain would be particularly affected due to specific soils characteristics that make these areas more susceptible to contamination from surface sources. In areas where cattle congregate, grazing would contribute to excessive soil compaction and degradation of surface vegetative community. This would potentially impact karst resources in

close proximity through alterations in surface to subsurface drainage patterns and also in surface plant and animal communities, both of which influence important biotic and abiotic processes within caves and other karst features.

Those areas open to grazing within zones of high and medium karst potential occurrence would have a greater risk of adverse impacts than those areas across low karst potential occurrence zones. Table 4-14 below shows the number of acres open to livestock grazing on BLM-administered lands across areas of high and medium karst potential occurrence by each alternative. Critical karst resource zones, which occur within sections of high karst potential occurrence, are also represented in the table. These resource areas contain hydrologically important karst features that provide rapid recharge of karst groundwater aquifers from surface runoff and serve an integral function in providing critical drinking water supplies to major communities, ranching operations, and springs that support rivers and important riparian habitats.

Table 4-14. Livestock Grazing Management Decisions-Number of Acres Open across Areas of High and Medium Karst Potential Occurrence by Alternative

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Acres open across high karst potential occurrence	573,955	464,401	469,457	572,174	574,929
Acres open across medium karst potential occurrence	781,620	428,926	744,700	781,996	783,755
Acres open across critical karst resource zones	209,431	156,177	163,511	209,623	210,846

Impacts from Management Common to All Alternatives

Under impacts from management common to all action alternatives, potential adverse impacts to karst resources associated with grazing would include decreased surface vegetation, which could result in soil destabilization and increased erosion, as well as increased potential for fecal contamination of karst aquifer.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions listed under Management Common to All Action Alternatives for grazing.

Impacts from the No Action Alternative

Under the No Action Alternative, 1,355,575 acres would be open to grazing across areas of high and medium karst potential occurrence. Approximately 209,431 of these acres occur within critical karst resource zones. Almost the entire acreages of zones of high and medium karst potential occurrence, as well as the majority of designated critical resource zones would be open to livestock grazing under this alternative (see Table 4-14).

Impacts from Alternative A

Under Alternative A, 893,327 acres within areas of high and medium karst potential occurrence would be open to livestock grazing. A total of 156,177 of these acres occur within critical karst resource zones; a difference of 54,209 acres compared to the No Action Alternative. The risk of adverse impacts to karst resources would be smaller under this alternative compared to the No Action Alternative.

Impacts from Alternative B

Under Alternative B, approximately 1,214,157 acres within areas of high and medium karst potential occurrence would be open to livestock grazing. A total of 163,511 of these acres occur within critical karst resource zones. With less acres open to livestock grazing within zones of high and medium karst potential occurrence and less acres open within critical karst resource zones, the risk of adverse impacts to karst resources would be smaller under this alternative compared to the No Action Alternative.

Impacts from Alternative C

Under Alternative C, 1,354,170 acres within zones of high and medium karst potential occurrence would be open to livestock grazing. Approximately 209,623 of these acres occur within critical karst resource zones. Almost the entire acreages of areas of high and medium karst potential occurrence, as well as the majority of designated critical resource zones would be open to livestock grazing under this alternative (see Table 4-14). Risk of adverse impacts would be slightly less under this alternative compared to the No Action Alternative.

Impacts from Alternative D

Under Alternative D, 1,358,684 acres within areas of high and medium karst potential occurrence would be open to livestock grazing. Approximately 210,846 of these acres occur within critical karst resource area. Almost the entire acreages of areas of high and medium karst potential occurrence, as well as the majority of designated critical karst resource zones would be open to livestock grazing under this alternative (see Table 4-14). Risk of adverse impacts would be comparable compared to the No Action Alternative.

4.2.2.2.10 Impacts of Recreation Actions on Karst Resources

Recreational management decisions would potentially have both beneficial and adverse impacts to karst resources. As discussed in Section 3.2.3, Cave/Karst Resources, increased visitation to caves has resulted in impacts to karst resources. The impacts associated with increased visitation to caves would include trampling and degradation of unique and/or fragile speleothems and damage to cave ecosystems. A greater influx of nutrients in the form of food items and trash left by visitors in the cave could potentially result in an imbalance among faunal trophic relationships by attracting a greater number of surface predators into the cave environment (Krejca and Myers 2005). This could indirectly reduce species diversity within the cave. Microbial communities would also be adversely impacted through excessive cave visitation. The closure of some areas to recreational activities that also include karst features would minimize potential damage to karst resources.

Impacts from Management Common to All Alternatives

Impacts to karst resources from the proposed decisions, listed under the management common to all alternatives, would potentially include: decreased erosion associated with the confinement of OHV use to established roads and trails, increased native vegetation associated with restoration efforts on SMRA's, and other special management areas, while adverse impacts would include increased erosion along designated trails within high or medium karst potential occurrence areas associated with increased use.

Impacts from Management Common to All Action Alternatives

Under the Management Common to All Action Alternatives, the Pecos River Equestrian ERMA, the La Cueva Trails SRMA, and the Black River SRMA would be designated. All of these occur across mostly karst-dense landscapes, particularly the Black River SRMA, which is located within critical karst resource zones. Potential direct and indirect adverse impacts to karst resources could occur as a result of increased recreational activities within these areas, as described above.

In addition, the Cave Resources SRMA designation would be converted to an ACEC designation. ACEC designations highlight areas where special management attention is needed to protect, and prevent irreparable damage to important and relevant values, such as historical, cultural, and scenic values, fish, or wildlife resources or other natural systems or processes (BLM 1988). As is the case with SRMAs, recreation is not the primary focus under ACEC designation. Please see the Special Designations section 4.4 for more detail on the Cave Resources ACEC.

Impacts from the No Action Alternative

Under the No Action Alternative, the Cave Resources SRMA, covering 8,626 acres, would remain designated as would the Pecos River Corridor (5,627 acres) and Hackberry Lake (53,560 acres) SRMAs. Karst resources located within the nine units of the Cave Resources SRMA would receive some beneficial impacts through surface protection from mineral development and other land uses, while continuing to serve

an important educational and recreational role for the public. There would also be beneficial impacts from the no surface occupancy restriction of the Pecos River Corridor SRMA (5,627 acres) to leasable mineral development and the closure to solid mineral leasing and mineral material disposal.

Impacts from the Action Alternatives

There would be no impact to karst resources as a result of proposed recreational decisions listed specifically under Alternatives A through D. Currently, there are approximately 20 gated caves that are frequented by visitors and require permits issued through the CFO for entry. All other ungated caves across the planning area are open to the public; therefore, illegal entry is not a significant issue. Visitation to ungated caves, irrespective of whether particular proposed SRMAs or ERMAs are designated, is not expected to increase.

4.2.2.2.11 Impacts of Travel Management Actions on Karst Resources

Adverse impacts from travel management to karst resources would be minimized if areas designated as closed or limited to OHV use contained caves and other karst features in which entry was not permitted. Potential indirect adverse impacts would include alteration of surface water infiltration and drainage around karst features as a result of soil compaction and erosion and damage to surface vegetative community around cave entrances that would negatively affect cave species.

As stated in Section 3.3.4, Travel and Transportation Management, open areas are those parts of the planning area where vehicle travel is permitted both on and off roads if the vehicle is operated responsibly in a manner unlikely to cause significant undue damage to the environment. Closed areas do not allow any OHV use, except in conjunction with BLM activities. Limited areas allow OHV use, but restrict that use to existing designated roads or ways.

Travel management decisions would have beneficial impacts to karst resources where travel is restricted to existing roads and trails or closed to all motorized travel. Table 4-15 summarizes those portions of the planning area designated as medium and high karst occurrence potential that are OHV limited and closed.

Table 4-15. High and Medium Karst Potential Occurrence (acres) and Travel on BLM-administered Lands by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
High, OHV limited	567,738	567,600	567,600	568,495	568,495
High, travel-closed	9,092	9,233	9,233	8,338	8,338
Medium, OHV limited	783,439	783,772	783,772	783,769	783,769
Medium, travel-closed	545	217	217	217	217
Total	***1,360,814***	***1,360,822***	***1,360,822***	***1,360,819***	***1,360,819***

Impacts from Management Common to All

There would be no significant impact to karst resources from proposed decisions listed under management common to all alternatives because they do not address surface or subsurface damage. Additionally, all alternatives propose a comparable acreage of high and medium karst potential that is designated as closed or OHV limited.

To note, the construction, maintenance, rehabilitation, abandonment, and closure of all roads subject to BLM jurisdiction would be conducted according to the BLM's Road Policy, Standards and Procedures (BLM 1997, Road). Additional policy and guidance for construction, maintenance, rehabilitation, abandonment, and closure of roads can be found in BLM Manual 9113-1 (BLM 2011a), BLM Manual 9113-2 Roads Design Handbook (BLM 2011b), BLM Manual 9115 Roads National Inventory and Condition Assessment and Guidance & Instructions Handbook (BLM 2012b), and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development – the Gold Book (BLM 2007b).

Impacts from Management Common to All Action Alternatives

There would be no significant impact to karst resources from proposed decisions listed under Management Common to All Action Alternatives because they do not address surface or subsurface damage.

4.2.2.2.12 Impacts of Land Use Authorization Actions on Cave / Karst Resources

Impacts to karst resources from development activities, such as ROWs for roads, pipelines, power lines, easements, and utility/transportation systems, would potentially increase if placed in zones of high karst potential occurrence. Indirect impacts would include excessive sedimentation and erosion, degradation of water quality, and alteration of water drainage and infiltration routes as a result of surface-disturbing activities. Direct impacts to the surface plant and animal communities through the removal of vegetation and cover would indirectly impact the cave ecosystem, as the surface community is the primary source of nutrients to the cave system.

Impacts from Management Common to All Alternatives

Management common to all decisions, such as the requirement of site-specific analysis for ROW approval, the placement of facilities on existing structures when possible, and conditions of ROW grants contingent upon the sensitivity of affected resources, would provide a direct beneficial impact to karst resources through additional protection from surface-disturbing activities associated with ROW development. Under this alternative, those karst resources within the Cave Resources SRMA would still receive some beneficial impacts from the continued designation of 8,626 acres as ROW avoidance or exclusion areas.

Additionally, under all of the alternatives, approximately 19,596 acres in areas of high karst potential occurrence and 30,517 acres in medium karst potential occurrence would be dedicated to the development of ROW corridors. Adverse impacts to karst resources, as those described above, would be expected to occur within these areas with high and medium karst occurrence potential.

Impacts from Management Common to All Action Alternatives

There are no decisions listed under Management Common to All Action Alternatives. All cave/karst features, however, would continue to receive beneficial impacts from ROW avoidance or exclusion because there will be a 984-foot buffer around them under all the action alternatives.

Impacts from the No Action Alternative

Under this alternative, terms and conditions of ROW grants would depend on the sensitivity of the affected resources and existing laws and regulations already established to protect them.

Impacts from Alternative A

Under Alternative A, all future ROWs for pipelines, roads, sites and power line development would avoid gypsum soils within the planning areas. This would reduce the risk of both surface and subsurface impacts to karst resources within the karst-dense and hydrologically important gypsum soils.

This alternative proposes the requirement of third-party compliance monitoring on all new ROW construction and reclamation activities throughout the planning area. Compared to the No Action Alternative, which does not require compliance monitoring, the potential risk of adverse impacts as a result of negligence and non-compliance with ROW development stipulations would be reduced.

Stipulations under Alternative A would reduce potential risks resulting from leakage, spills, and subsequent contamination by requiring leak detection and automatic shut-off systems on all hydrocarbon and salt water pipelines/storage facilities located across both critical resource zones and zones of high karst potential occurrence. The No Action Alternative does not propose any similar stipulations and, therefore, poses greater risks of leakage, spills, and contamination to the subsurface karst environment in comparison with Alternative A.

Impacts from Alternative B

Under Alternative B, gypsum soils within the planning areas would be avoided for all future ROWs for pipelines, roads, sites, and power line development.

This alternative proposes the requirement of third-party compliance monitoring on all new ROW construction and reclamation activities throughout zones of high karst potential occurrence. Compared to the No Action Alternative, which does not require compliance monitoring, the potential risk of adverse impacts as a result of negligence and non-compliance with ROW development stipulations would be reduced.

Stipulations under Alternative B would reduce potential risks resulting from leakage, spills, and subsequent contamination by requiring leak detection and automatic shut-off systems on all hydrocarbon and salt water pipelines/storage facilities located across both critical resource zones and zones of high karst potential occurrence. The No Action Alternative does not propose any similar stipulations and, therefore, poses greater risks of leakage, spills, and contamination to the subsurface karst environment in comparison with Alternative B.

Impacts from Alternative C

Under Alternative C, gypsum soils within the planning areas would be avoided for all future ROWs for pipelines, roads, sites and power line development.

Under this alternative, third-party compliance monitoring would be required only in situations where operators have a documented history of non-compliance. Qualitatively, the impact as described under Alternative A would be the same; however, the potential for adverse impacts is greater due to reduced monitoring of ROW development activities.

Stipulations under Alternative C would reduce potential risks from leakage, spills, and subsequent contamination by requiring leak detection and automatic shut-off systems on all hydrocarbon and salt water pipelines/storage facilities located across both critical resource zones and zones of high karst potential occurrence. The No Action Alternative does not propose any similar stipulations and, therefore, poses greater risks of leakage, spills, and contamination to the subsurface karst environment in comparison with Alternative C.

Impacts from Alternative D

The potential for adverse impacts would be greatest under Alternative D, which would not require compliance monitoring in relation to ROW construction and reclamation activities across the planning area.

Under Alternative D, leak detection and shut-off systems would not be required, thereby increasing the chances of greater contamination if leaks or spills should occur. Under this alternative, the magnitude of impacts would be the same as those under the No Action Alternative, which also does not require leak detection or shut-off systems.

4.2.2.2.13 Impacts of Water/Riparian Actions on Karst Resources

The integral relationship between karst landscapes and water increases the potential for adverse or beneficial impacts of any water-related management action under all the alternatives. Caves, sinkholes, fissures, and other karst features serve as natural conduits; water travels through these features without much filtration and quickly reaches aquifers, wells, springs, and other water sources, some of which provide water to critical riparian areas and also serve as water sources for municipal, agricultural, and industrial uses. The health of a riparian system may also give valuable information on the health of the associated karst features. All management actions that protect and minimize impacts to riparian areas, surface water, and groundwater will also provide indirect benefits to karst resources.

Protecting these areas interconnected to karst features through surface disturbance buffers reduces the risk of contaminants reaching the karst system, thereby minimizing risks to karst resources, including cave faunal and microbial communities.

Impacts from Management Common to All

Management common to all would provide beneficial impacts to karst resources through intensive management to assure water and vegetative quality. Karst resources associated with additional seeps, springs, or other water sources identified on public lands would receive indirect beneficial impacts through their incorporation into riparian habitat management plans (HMPs) and also through no surface disturbance stipulations in riparian areas (unless for riparian enhancement projects).

Also, of particular benefit would be the prohibition of saltwater injection wells above the Capitan Formation and the requirement of four-strand casings within formations hydrologically connected to the Capitan Reef Aquifer. These measures would reduce the risk of contamination into the karst environment and also reduce the risk of groundwater contamination. This is particularly important along the Capitan Formation, which contains numerous karst recharge features.

Annual biological surveys required for the assessment of riparian health would also beneficially impact karst resources by providing data on the health of associated karst features.

Impacts from Management Common to All Action Alternatives

Karst resources located within playas would benefit from additional minimization of surface disturbance, as occupation and surface disturbance would not be allowed within 984 feet of a highly productive or moderately productive playa.

Stipulations on seeps and springs management would be carried forward and would indirectly benefit karst resources through additional protections, including NSO stipulations on future oil and gas leases, avoidance of future ROW actions through riparian habitat areas, withdrawal from mining claim location and closure to mineral material disposal and mineral leasing, restrictions on surface-disturbing activities such as plant collecting and camping, and designation as closed to OHV use.

A 984-foot surface disturbance buffer would be placed around all springs, seeps, and downstream riparian areas. Beneficial impacts would be the same as described under the No Action Alternative.

Impacts from the No Action Alternative

Under the No Action Alternative, stipulations on seeps and springs management would be carried forward and would indirectly benefit karst resources through additional protections, including NSO stipulations on future oil and gas leases, avoidance of future ROW actions through riparian habitat areas, withdrawal from mining claim location and closure to mineral material disposal and mineral leasing, restrictions on surface-disturbing activities such plant collecting and camping, and designation as closed to OHV use.

In addition, this alternative retains the 656-foot surface disturbance buffer around all springs, seeps, and downstream riparian areas.

Impacts from Alternatives A and B

Under Alternative A, a 984-foot surface disturbance buffer would be placed around spring headwaters, seeps, and downstream riparian areas. Qualitatively, beneficial impacts would be the same as described under the No Action Alternative and the magnitude of benefits to karst resources would be similar.

Impacts from Alternative C

Under Alternative C, a 984-foot surface disturbance buffer would be placed around all springs, seeps, and downstream riparian areas and motorized and mechanized travel would only be allowed for BLM administrative use. Beneficial impacts would be slightly greater than under the No Action Alternative.

Impacts from Alternative D

Under Alternative D, a 984-foot surface disturbance would be placed around all springs, seeps, and downstream riparian areas. Beneficial impacts would be the same as described under the No Action Alternative.

4.2.2.2.14 Impacts of Renewable Energy on Karst Resources

Impacts from Management Common to All

All management common to all decisions would potentially provide some beneficial impacts to karst features that also occur on LPC and/or dunes sagebrush lizard (*Sceloporus arenicolus*; DSL) habitat, as all applications to permit either solar or wind energy sites across the planning area would require the demonstration that proposed projects would not adversely impact these species' habitats.

Adoption of programmatic policies and BMPs in both the Solar Energy Development Programmatic EIS ROD (BLM 2012a) and the Wind Energy Development Programmatic EIS ROD (BLM 2005) would also potentially minimize adverse impacts to karst resources across the planning area.

Impacts from Management Common to All Action Alternatives

Impacts from Management Decisions Common to All Action Alternatives would include the exclusion of wind and solar, and closure to geothermal development in areas that are within known karst areas. In addition, all action alternatives encourage the placement of wind development projects in areas where transmission corridors are already located and where transmission systems are already in place.

As a result, adverse impacts to karst resources, including surface disturbance near karst features as a result of new access roads and construction, would be greatly minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, the BLM would close and exclude 1,819,929 acres from geothermal and solar development projects and 7,056 acres from wind development projects. Restrictions on the location of solar or wind energy sites would continue to be implemented on specific sites across the planning area, with the majority of the planning area excluded for solar development, as identified by the Solar Energy Development Programmatic EIS ROD (BLM 2012a). Those sites restricted from wind development projects include WSAs, WSRs, VRM Class I and II areas, and areas with known karst occurrences (for complete list of restrictions, see Chapter 2, Alternatives Matrix). Wind energy development would be restricted in designated SMAs to protect sensitive soils. In addition, applications to permit either solar or wind energy sites on public land within the planning area would be considered only if the applicant can demonstrate no negative impacts on avian and bat species. All of these management prescriptions would benefit karst resources by minimizing surface disturbance and its associated adverse impacts.

Impacts from the Action Alternatives

There are no renewable energy decisions specific to any of the action alternatives that would significantly impact karst resources.

4.2.2.2.15 Impacts of Minerals Development Actions on Karst Resources

There are many aspects of mineral development that would adversely impact karst resources. Adverse impacts from contamination are a primary concern, as drilling fluids, produced saltwater, oil and/or gas, cuttings, and cement could quickly enter groundwater, and subsequently aquifers, springs, and other resurgences through karst features that serve as natural conduits to these water sources.

Cementing operations may plug or alter groundwater flow, potentially reducing the water quantity at springs and water wells. Production facilities such as transfer stations and pipelines may fail and allow contaminants to enter caves and freshwater systems. Downhole casing and cementing failures can allow migration of fluids and/or gas between formations and aquifers. Contamination would also indirectly result in adverse impacts to cave fauna, including rare, cave-adapted species.

Blasting, heavy vibrations, an increase in impermeable cover due to pipeline, road and utilities construction, could adversely impact karst resources through alterations in the surface and/or subsurface drainage systems. Excessive siltation and sedimentation can affect surface water infiltration and plug downstream sinkholes, and other karst features, resulting in adverse impacts to groundwater quality and to the cave ecosystem. Indirect impacts would include potential disruptions in recharge processes and moisture regimes within the karst system. As a result, subsidence or sudden surface collapse could potentially occur. Cave fauna would also be indirectly impacted through displacement or extermination. Activities associated with mineral development could also contribute to changes in airflow patterns within the karst environment and alterations in the surface communities (vegetative and animal) surrounding karst features. This could indirectly impact the cave ecosystem, as well as speleothem formations within the caves.

Risks to karst resources would be reduced by a management emphasis on detection, avoidance, and mitigation. Stipulations and COAs specific to oil and gas development across karst landscapes would help to further minimize impacts associated with mineral exploration, production, and reclamation (see Chapter 2).

Mineral development across high and medium karst potential occurrence zones would pose the greatest threat to karst resources, as karst feature densities are higher within these karst landscapes. Areas designated as critical karst resource zones, which contain important recharge features, would also be potentially impacted from surface- and subsurface-disturbing activities associated with mineral development.

Table 4-16. Number of Predicted Wells and Total Predicted Surface Disturbance within Areas of High and Medium Karst Potential Occurrence on BLM Surface Lands by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Number of predicted wells on **high* karst potential occurrence acreage within BLM-administered lands only** (based on % of land open to surface disturbance)	1,351	1,027	814	1,341	1,390
Number of predicted wells on **medium karst potential occurrence acreage within BLM-administered lands only** (based on % of land open to surface disturbance)	2,115	1,607	1,274	2,100	2,176
Total # of Predicted Wells	***3,466***	***2,634***	***2,087***	***3,441***	***3,566***
Total predicted surface disturbance/acres on **high karst[1] potential acreage within BLM-administered lands only**	2,648	2,013	1,595	2,630	2,725
Total predicted surface disturbance/acres on **medium karst potential acreage within BLM-administered lands only**	4,145	3,151	2,497	4,116	4,266
Total Predicted Surface Disturbance Acreage	**6,794**	**5,164**	**4,092**	**6,746**	**6,991**

*Karst critical resource zones are all located within zones of high karst potential occurrence.

Fluid and Solid Leasables

The number of acres closed or withdrawn from fluid and solid leasable mineral development varies across alternatives. Karst resources would benefit when located within open with major constraints or closed leasing categories because these areas would be excluded from surface disturbance. Table 4-17 shows the number of acres both open with major constraints and closed to mineral development across areas of high and medium karst potential by each alternative.

Table 4-17. Acres Closed and Open with Major Constraints to Leasable Mineral Management Decisions by Alternative within Areas of High and Medium Karst Potential Occurrence

Karst Potential Occurrence	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
High – closed	33,263	144,826	100,494	35,285	31,476
High – avoid (open with major constraints)	16,257	37,763	104,636	36,559	37,191
Medium – closed	16,514	436,718	464,776	292	292
Medium – avoid (open with major constraints)	19,808	36,719	36,204	31,660	27,279
Total	***85,842***	***656,026***	***706,110***	***103,796***	***96,238***

Impacts from Management Common to All

Management common to all alternatives would include several prescriptions in place to minimize and mitigate for surface disturbance, all of which would reduce the risk of adverse impacts to karst resources. Some of these include a requirement to revegetate disturbed areas post-construction; the utilization of reclamation activities that would enhance reclamation pits, roads, and pads for maximum surface protection; and a management protection emphasis on those features designated as significant (including newly discovered features that would be considered significant until further examination deems otherwise).

Potential adverse impacts to karst resources as a result of drilling would be minimized through careful review of karst features, as well as on-site field surveys to determine the presence of unrecorded karst features across areas of interest. Depending on findings, drill operations may be relocated as necessary.

The ROD for the Dark Canyon EIS (BLM 1994) would continue to guide oil and gas resources in a portion of Dark Canyon. Karst resources within this portion of the planning area would receive beneficial impacts as a result of management prescriptions already in place, including closure of 8,320 surface acres to future oil and gas leasing and an NSO stipulation for existing leases or portions of existing leases within the cave protection zone. Directional drilling, however, would still be allowed from outside the cave protection zone. This would adversely impact karst resources if undetected voids with no surface expression were encountered.

Impacts from Management Common to All Action Alternatives

Impacts from Management Common to All Action Alternatives would provide beneficial impacts to karst resources through additional stipulations for oil and gas development across karst landscapes. Newly proposed COAs would apply to all development projects and would include prescriptions addressing hydraulic fracturing pond requirements, four-string casing in specific areas, the requirements of erosion control and reclamation plans in zones of critical and high karst potential occurrence, and the presence of third-party compliance monitors on projects that may have specific risks or environmental concerns. In addition, monitors would be required on projects with operators with a history of non-compliance. All new management prescriptions would provide additional means of minimizing adverse impacts to karst resources, including the requirement of third-party karst surveys in high karst potential occurrence zones. The requirement of a third-party karst survey within medium karst potential occurrence zones will be at the discretion of the BLM. These requirements do not apply exclusively to geophysical exploration, but all activities that may cause disturbance to the surface. Proposed Management Common to All Action Alternatives would minimize surface disturbances and other impacts to karst resources through these various COAs and stipulations.

Impacts from the No Action Alternative

Under the No Action Alternative, 6,794 acres of surface disturbance and 3,466 wells are predicted within areas of high and medium karst potential occurrence across BLM surface lands within the planning area (see Table 4-16). A total of 85,842 acres would be designated as avoidance areas or closed to leasable mineral development (see Table 4-17). Adverse impacts associated with surface disturbance, as those described above, would continue within those areas open to leasable mineral development.

If the No Action Alternative is adopted, management decisions for karst resources as described in the 1997 RMP would remain intact. This alternative does not propose management prescriptions or stipulations on many aspects of mineral development, such as restrictions on locations of earthen hydraulic fracturing ponds and hydraulic fracturing water containment and testing, requirements for tank battery liners and secondary containment areas, and a completion deadline on all interim reclamation projects. Adverse impacts to karst resources would have a greater potential of occurring under this alternative compared to the action alternatives.

Impacts from Alternative A

Under Alternative A, a total of 656,026 acres would be designated as avoidance areas or closed to leasable mineral development across karst landscapes on BLM surface lands (see Table 4-17). This represents a substantial increase in the number of acres closed or avoided compared to the No Action Alternative.

Additionally, approximately 5,164 acres of surface disturbance and 2,634 new wells are predicted within areas of high and medium karst potential occurrence across BLM surface lands within the planning area (see Table 4-16). Adverse impacts associated with surface disturbance, as those described above, would continue within these areas, however; compared to the No Action Alternative, this alternative presents a 24% decrease in both the number of predicted acres of surface disturbance and in the number of predicted wells.

Many stipulations and COAs for oil and gas development through critical karst resource zones and zones of high karst potential occurrence would be required under this alternative, including closed loop systems for drilling, caps on number of acres allotted for surface disturbance per lease, and the requirement of leak detection and automatic shut-off systems for wells and hydrocarbon and salt water pipelines/storage facilities. Compared to the No Action Alternative, which has less stringent management prescriptions and stipulations, the magnitude of adverse impact would be smaller under Alternative A.

Impacts from Alternative B

Under Alternative B, stipulations and COAs for all aspects of oil and gas development across karst landscape would be the most stringent. A total of 706,110 acres would be designated as avoidance areas or closed to leasable mineral development across karst landscapes on BLM surface lands (see Table 4-17). This represents a substantial increase in the number of acres closed or avoided compared to the No Action Alternative.

Under this alternative, 4,092 acres of surface disturbance and 2,087 wells are predicted across high and medium karst potential occurrence zones. Compared to the No Action Alternative, Alternative B represents a 40% decrease in both the number of predicted acres of surface disturbance and number of predicted wells.

Many stipulations and COAs for oil and gas development through critical and high karst potential occurrence zones would be required under this alternative, including closed loop systems for drilling, caps on number of acres allotted for surface disturbance per lease, and the requirement of leak detection and automatic shut-off systems for wells and hydrocarbon and salt water pipelines/storage facilities. Compared to the No Action Alternative, which has less stringent management prescriptions and stipulations, the magnitude of adverse impact would be smaller under Alternative B.

Impacts from Alternative C

Under Alternative C, many stipulations and COAs for oil and gas development through critical and high karst potential occurrence zones would be required under this alternative, including closed loop systems for drilling, caps on number of acres allotted for surface disturbance per lease, and the requirement of leak detection and automatic shut-off systems for wells and hydrocarbon and salt water pipelines/storage facilities.

Additionally, a total of 103,796 acres would be designated as avoidance areas or closed to leasable mineral development across karst landscapes on BLM surface lands (see Table 4-17). This represents a moderately substantial increase in the number of acres closed or avoided compared to the No Action Alternative.

Under this alternative, 6,746 acres of surface disturbance and 3,441 wells are predicted across high and medium karst potential occurrence zones. Compared to the No Action Alternative, Alternative C represents a small decrease in both the number of predicted acres of surface disturbance and number of predicted wells.

Impacts from Alternative D

Under Alternative D, management prescriptions and stipulations would include allowing hydraulic fracturing ponds on a case-by-case basis; disposal of produced water would also be allowed, as is the case under the No Action Alternative, however; they would be prohibited in critical karst resource zones and high karst potential occurrence zones. Leak detection systems would not be required under this alternative.

Under Alternative D, a total of 96,238 acres would be designated as avoidance areas or closed to leasable mineral development across karst landscapes on BLM surface lands (see Table 4-17). This represents a slight increase in the number of acres closed or avoided compared to the No Action Alternative.

Also, 6,991 acres of surface disturbance and 3,566 wells are predicted across high and medium karst potential occurrence zones. Compared to the No Action Alternative, Alternative D represents a slight increase in both the number of predicted acres of surface disturbance and number of predicted wells. Adverse impacts to karst resources would be slightly greater under Alternative D.

Salable and Locatable Minerals

The number of acres closed (or open with special terms and conditions) to salable mineral development or withdrawn from locatable mineral development varies across alternatives. Karst resources would benefit when located within these closed or withdrawn areas. Table 4-18 and Table 4-19 depict these areas across the alternatives.

Table 4-18. Acreage Closed or Open with Special Terms and Conditions to Salable Mineral Management Decisions by Alternative in High and Medium Karst Potential Occurrence Areas

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
High – closed or open with special terms and conditions to mineral entry (i.e., avoidance area)	64,757	266,484	287,026	168,806	90,210
Medium – closed or open with special terms and conditions to mineral entry (i.e., avoidance area)	22,020	528,337	546,452	218,818	153,502
Total	***86,777***	***794, 821***	***833,478***	***387,624***	***243,712***

Table 4-19. Acreage Open and Recommended for Withdrawal to Locatable Mineral Management Decisions by Alternative in High and Medium Karst Potential Occurrence Areas

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
High – open to mineral entry	608,561	475,789	447,481	575,006	578,702
Medium – open to mineral entry	997,112	921,657	932,436	988,587	992,501
Total	***1,605,673***	***1,297,446***	***1,379,917***	***1,563,593***	***1,571,203***
High – recommended (or previously recommended for withdrawal)	20, 007	152,782	181,084	53,564	49,881
Medium – recommended (or previously recommended for withdrawal)	9,469	84,821	74,041	17,881	13,970
Total	***29,476***	***237,603***	***255,125***	***71,445***	***63,851***

Impacts from Management Common to All

There are no proposed salable mineral decisions listed under management common to all that would significantly impact karst resources because they would not result in surface or subsurface disturbances.

Under locatable decisions, all karst landscape would be available for location of mining claims unless withdrawn. Although karst resources would potentially be impacted from any surface-disturbing activities associated with locatable mineral development, specific stipulations and COAs applied to activities conducted within karst landscape would be in effect and would minimize adverse impacts.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions for salable or locatable minerals under Management Common to All Action Alternatives that would significantly impact karst resources because they do not result in surface or subsurface disturbances.

Impacts from the No Action Alternative

Under the No Action Alternative, approximately 86,777 acres across areas of high and medium karst potential occurrence would be closed or open with special terms and conditions to salables mineral development. Approximately 29,476 acres across high and medium karst potential occurrence areas would be recommended for withdrawal from locatable minerals development (see Table 4-18 and Table 4-19). Adverse impacts to karst resources would continue within remaining areas open to surface-disturbing activities associated with mineral development. Potential adverse impacts to karst resources are described at the beginning of this section.

Impacts from Alternative A

Under Alternative A, approximately 794,821 acres across areas of high and medium karst potential occurrence would be closed or open with special terms and conditions to salables mineral development, while approximately 237,603 acres across high and medium karst potential occurrence areas would be recommended for withdrawal from locatables mineral development withdrawal (see Table 4-18 and Table 4-19).

Compared to the No Action Alternative, Alternative A represents a substantial increase in the number of acres closed or open with moderate constraints to salable mineral development and also a substantial increase in the number of acres recommended for withdrawal from locatables mineral development (see Table 4-18 and Table 4-19). The magnitude for adverse impacts to karst resources would, therefore, be greater under the No Action Alternative when compared to Alternative A.

Impacts from Alternative B

Under Alternative B, approximately 833,478 acres across areas of high and medium karst potential occurrence would be closed or open with special terms and conditions to salables mineral development, while approximately 255,125 acres across high and medium karst potential occurrence areas would be recommended for withdrawal from locatables mineral development (see Table 4-18 and Table 4-19).

Compared to the No Action Alternative, Alternative B represents a substantial increase in the number of acres closed or open with moderate constraints to salables mineral development and also a substantial increase in the number of acres recommended for withdrawal from locatables mineral development (see Table 4-18 and Table 4-19). The magnitude for adverse impacts to karst resources would, therefore, be greater under the No Action Alternative when compared to Alternative B.

Impacts from Alternative C

Under Alternative C, approximately 387,624 acres across areas of high and medium karst potential occurrence would be closed or open with special terms and conditions to salables mineral development, while approximately 71,455 acres across high and medium karst potential occurrence areas would be recommended for withdrawal from locatables mineral development (see Table 4-18 and Table 4-19).

Compared to the No Action Alternative, Alternative C represents a substantial increase in the number of acres closed or open with moderate constraints to salable mineral development and also a substantial increase in the number of acres recommended for withdrawal from locatables mineral development (see Table 4-18 and Table 4-19). The magnitude for adverse impacts to karst resources would, therefore, be greater under the No Action Alternative when compared to Alternative C.

Impacts from Alternative D

Under Alternative D, approximately 243,712 acres across areas of high and medium karst potential occurrence would be closed or open with special terms and conditions to salables mineral development, while approximately 63,851 acres across high and medium karst potential occurrence areas would be recommended for withdrawal from locatables mineral development.

Compared to the No Action Alternative, Alternative D represents a substantial increase in the number of acres closed or open with moderate constraints to salable mineral development and also a substantial increase in the number of acres recommended for withdrawal from locatables mineral development (see Table 4-18 and Table 4-19). The magnitude for adverse impacts to karst resources would, therefore, be greater under the No Action Alternative when compared to Alternative D.

4.2.2.2.16 Impacts of Special Designation Actions on Karst Resources

Special designations would provide beneficial impacts to karst resources if they impart restrictions on surface- and subsurface-disturbing activities within their boundaries. Restrictions on surface- and subsurface-disturbing activities associated with various land use activities would minimize potential impacts to karst resources located within these special designation areas.

Areas of Critical Environmental Concern

Impacts to karst resources within the proposed Cave Resources ACEC as a result of mineral development would depend on the number of acres within this designation that are closed to these activities and associated surface disturbance. The number of acres closed, designated as NSO or recommended for withdrawal varies between the No Action Alternative and the action alternatives and is shown in Table 4-20.

Table 4-20. Approximate Acres Open with Major Constraints (NSO), Closed or Recommended for Withdrawal to Mineral Development across the Cave Resources ACEC by Alternative

Cave Resources ACEC (19,625 acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasables – acres open with major constraints (NSO)/closed	–	6,128	6,112	6,153	8,538
Salables – acres closed	10,520	19,625	19,625	19,610	17,200
Locatables – acres recommended for withdrawal	9,141	19,625	19,625	18,827	17,201

Impacts from Management Common to All Alternatives

There are no proposed special designation decisions listed under management common to all alternatives; however, all alternatives provide management prescriptions to minimize risks to karst resources within the special designations proposed. While all the alternatives provide some level of protection to karst resources within special designations, the magnitude of that protection varies across alternatives and is discussed below.

Impacts from Management Common to All Action Alternatives

Under Management Common to All Action Alternatives, approximately 19,625 acres would be designated under the Cave Resources ACEC (see Table 4-20). Long-term protection for karst resources from various land uses would be maintained and risk of impacts would be reduced through management prescriptions such as closure to all future oil and gas leasing on some of the units within this ACEC, requiring the installation of erosion control and leak detection methods on all surface use plans, limited OHV designations, and NSO around heavily concentrated karst areas or within 984 feet of surface waters or defined features that feed into a cave system and designating ROW exclusion where pre-existing access rights do not exist.

Lonesome Ridge, another proposed ACEC under all action alternatives, contains relevant and important karst features, including six known significant caves. Karst features within this ACEC would benefit from special management prescriptions proposed, including future ROW exclusion, exclusion of renewable energy development, and restrictions on surface disturbances.

In addition to the Cave Resources and Lonesome Ridge ACECs, there are three other ACECs containing relevant and important karst features that are proposed for designation. The ACECs designated vary by alternative and are shown in Table 4-21 below.

Table 4-21. Proposed Areas of Critical Environmental Concern with Relevant and Important Karst Features by Alternative

ACECs	Alternative A	Alternative B	Alternative C	Alternative D
Cave Resources	19,625	19,625	19,625	19,625
Lonesome Ridge	2,981	3,021	3,021	3,021
Gypsum Soils	–	65,562	65,554	–
Carlsbad Chihuahuan Desert Rivers	108,474	–	–	–
Seven Rivers Hills	–	1,027	1,027	954
Total acreage of proposed ACECs with relevant and important karst features	***131,080***	***89,235***	***89,227***	***23,600***

Under Management Common to All Action Alternatives, risks to karst resources would be further minimized through the closure of approximately 13,000 acres to salable and locatable mineral leasing. See Table 4-20 for a comparison of acreages open and closed to leasable, salable, and locatable mineral development by alternatives.

Impacts from the No Action Alternative

Under the No Action Alternative, nine karst management units would continue to be managed under current prescriptions. These units would have management prescriptions associated with the designation as a Cave Resources SRMA, including an NSO stipulation on all future oil and gas leases, future ROW avoidance through cave areas, and restrictions on surface disturbances. As Table 4-20 displays, however, there would be only 56% within this unit closed to leasables and salables mineral development and 48% closed to locatables.

Under this alternative, adverse impacts to karst resources would also be minimized through a 656-foot surface disturbance buffer that would be placed around all known cave entrances, passages or aspects of significant caves or significant karst features. Indirect adverse impacts to karst resources within these ACECs would be expected to continue in areas that remain open to surface-disturbing activities.

Impacts from Alternative A

Under Alternative A, management actions propose 131,080 acres containing relevant and important karst features for ACEC designation (see Table 4-21). Additional karst resources in the hydrologically and biologically important gypsum soils would benefit from the designation of the Carlsbad Chihuahuan Desert Rivers ACEC, although karst landscapes in two other proposed ACECs, the equally important Gypsum Soils and Seven Rivers Hills ACECs, would not. Both of these areas play an important role in local groundwater recharge and resurgences, which could increase risks to karst resources under this alternative.

Additionally, 6,128 acres of the proposed Cave Resources ACEC would be open with major constraints (NSO) and 19,625 acres would be closed to leasables mineral development and closed/recommended for withdrawal from salables and locatables. Compared to the No Action Alternative, which represents an 86% decrease in the number of acres with NSO or closed to leasables and salables mineral development and a substantial decrease in the number of recommended acres for withdrawal from locatables development, the magnitude of adverse impacts to karst resources would be smaller under this alternative.

Impacts from Alternative B

Under Alternative B, management actions propose 89,235 acres containing relevant and important karst features for ACEC designation. Alternative B also proposes the designation of the Gypsum Soils ACEC, which would beneficially impact groundwater recharge in the region and also provide additional protection to several significant caves in the gypsum plains region (see Table 4-21).

Additionally, as with Alternative A, this alternative calls for approximately 6,112 acres of the proposed Cave Resources ACEC to be open with major constraints (NSO) or closed to leasables mineral development and 19,625 acres to be closed/recommended for withdrawal from salables and locatables. Compared to the No Action Alternative, the magnitude of adverse impacts would be smaller under this alternative.

Impacts from Alternative C

Under Alternative C, management actions propose 89,227 acres containing relevant and important karst features for ACEC designation. Alternative C also proposes the designation of the Gypsum Soils ACEC (see Table 4-21); beneficial impacts would be similar to those under Alternative B.

Additionally this alternative calls for 6,153 acres of the proposed Cave Resources ACEC to be open with major constraints (NSO) and 19,610 acres NSO or closed to leasables mineral development and all but 798 acres closed/recommended for withdrawal from salables and locatables. Compared to the No Action Alternative, the magnitude of adverse impacts would be similar to those under Alternative A.

Impacts from Alternative D

Under Alternative D, management actions propose 23,600 acres containing relevant and important karst features for ACEC designation. Under this alternative, 19,625 acres of the proposed Cave Resources ACEC would be open with major constraints (NSO) or closed to leasables mineral development.

Approximately 17,200 acres would be closed/recommended for withdrawal from salables/ locatables. Compared to the No Action Alternative, the magnitude of adverse impacts would be identical to those under Alternative A. Compared to the No Action Alternative, the magnitude of adverse impacts would be smaller under this alternative.

4.2.2.2.17 Impacts of Wilderness Study Areas on Karst Resources

Impacts from Management Common to All

All karst resources within the four designated WSAs comprising a total of 7,086 acres, would benefit from additional protection through special management requirements, including a closed designation for all future leases and no reissuing of current leases once expired, which would enhance and preserve its wilderness values, including karst resources within the unit. In addition, new permanent facilities and new surface disturbance would be prohibited, all of which would minimize both direct and indirect adverse impacts to karst resources, such as alterations or obstruction of surface and subsurface drainage patterns and water infiltration, potential subsidence and contamination of groundwater, disruption of subterranean environment which would impact the associated biological community and alterations in surface vegetation community.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions listed under Management Common to All Action Alternatives.

Impacts from the No Action Alternative

Under the No Action Alternative, the four WSAs would remain under their current designation and managed accordingly under prescriptions outlined in the Carlsbad RMP (BLM 1988) as amended, such as closed to all future leasing or NSO designation, closed to salables, withdrawn from locatables, OHV limited, closed to renewable energy and designated as VRM Class I, and also as a ROW avoidance area. These management prescriptions would continue to minimize adverse impacts to karst resources through restrictions on surface-disturbing activities.

Alternatives A, B, and C

If the WSA designation is removed, the four previously designated WSAs would be managed as closed to leasable and salable development and recommended for withdrawal from locatable development. Adverse impacts under these three alternatives would be comparable to those under the No Action Alternative and as described under management common to all.

Alternative D

Under Alternative D, adverse impacts resulting from loss of WSA designation would be greater than those found under the other alternatives because management prescriptions would be less stringent for surface-disturbing activities. Unlike the other four alternatives, leasable mineral development would be open with major constraints, salable mineral development would be open with moderate constraints and the areas would be open for locatable development. In addition, the proposed VRM class on these lands would be Class III.

Adverse impacts, as those described under management common to all alternatives, would be greater under Alternative D compared to the No Action Alternative and also compared to Alternatives A through C.

4.2.2.2.18 Impacts of Wild and Scenic Rivers on Karst Resources

Impacts from Management Common to All

There are no proposed management decisions common to all alternatives that would significantly impact karst resources.

Impacts from Management Common to All Action Alternatives

Under Management Common to All Action Alternatives, the Black River would be recommended as suitable for inclusion in the NWSRS and would be given the same management prescriptions as other WSR areas, including a VRM Class II classification. Beneficial impacts to karst resources would result, as the area is located in a critical karst resource zone and WSR designation would limit surface-disturbing activities that would potentially result in adverse impacts to these karst resources, such as subsurface contamination and alterations in surface drainage patterns.

4.2.2.2.19 Impacts of Backcountry Byways Actions on Karst Resources

Impacts from Management Common to All

There are no proposed management decisions common to all alternatives that would significantly impact karst resources.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions listed under Management Common to All Action Alternatives that would significantly impact karst resources.

Impacts from the No Action and Action Alternatives

Under the No Action Alternative and Alternatives C and D, the Dark Canyon Road Loop would not be proposed for designation as a BLM Backcountry Byways and would be open to leasable, salable, and locatable mineral development; therefore, karst resources within this area would not benefit from additional protective management prescriptions.

Under Alternatives A and B, the Dark Canyon Road Loop would be designated as a BLM Backcountry Byway. Management prescriptions would include open to leasables with moderate constraints, open to salable with special terms and stipulations, excluded from all renewables development, and designated as OHV limited. Karst resources within a 2-mile buffer of the Dark Canyon Road Loop would benefit from VRM Class II management on both sides of the road. Other stipulations under this VRM class would include an open status on locatables as well as ROWs, as long as they are compatible with VRM Class II restrictions under site specific analysis.

Under Alternative C, the Dark Canyon Road Loop would not be designated as a BLM Backcountry Byway. This alternative would be less beneficial to karst resources, as the buffer proposed would only cover 0.25 mile on both sides of the road as opposed to the 2-mile buffer proposed by Alternatives A and B. All other management prescriptions, however, would be the same as under Alternatives A and B, with the exception of salable mineral development. The loop would be open to salable, locatables, and ROWs as long as those permitted uses are shown to be compatible with the VRM class under a site-specific analysis.

Alternative D would minimize risks to karst resources with a proposed VRM management of Class III within a 1-mile buffer on both sides of the Dark Canyon Road. Because of VRM Class II prescriptions, Alternatives A and B would be the most beneficial to karst resources.

4.2.2.2.20 Impacts of Visual Resources on Karst Resources

VRM class designations have specific management objectives which, depending on the class designated, could beneficially impact karst resources. The objectives defined for VRM Class I and II include the preservation or retention of the existing character of the landscape and, therefore, minimize and at times prohibit surface-disturbing activities. Those impacts to karst resources associated with mineral development, ROW construction and maintenance and other land use authorizations and road and trail construction would be minimized within these VRM Class I and II designations. The number of acres designated as VRM Class I and II vary across the alternatives and is depicted below.

Table 4-22. VRM Class I and Class II Management Decisions (Acres) by Alternative

VRM Class	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***50,671***	***273,710***	***357,802***	***67,962***	***48,263***

Impacts from Management Common to All

There are no proposed management decisions common to all alternatives that would significantly impact karst resources.

Impacts from Management Common to All Action Alternatives

There are no proposed Management Decisions Common to All Action Alternatives that would significantly impact karst resources.

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 50,671 acres would be designated under either VRM Class I or II (see Table 4-22). Karst resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres. Various impacts on karst resources associated with ground-disturbing activities include alterations to surface and subsurface drainage patterns, disruptions in surface vegetative communities, which can cause indirect adverse effects to subsurface faunal communities, an increased potential for contamination of groundwater and excessive sedimentation loading and subsequent plugging of potentially important karst recharge features.

Impacts from Alternative A

Under Alternative A, a total of 273,710 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative: however, the magnitude of beneficial impacts would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designation.

Impacts from Alternative B

Under Alternative B, a total of 357,802 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative: however, the magnitude of beneficial impacts would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designation.

Impacts from Alternative C

Under Alternative C, a total of 67,962 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative: however, the magnitude of beneficial impact would be greater under this alternative because there is a substantial increase in the number of acres under the VRM Class I and II designation.

Impacts from Alternative D

Under Alternative D, a total of 48,263 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative because of the slight increase (5.4%) in the number of acres under the VRM Class I and II designation.

4.2.3 Vegetative Communities

4.2.3.1 Upland Vegetation including Noxious Weeds

This section analyzes and discusses impacts to upland vegetation and noxious weeds from management actions discussed in Chapter 2. Upland vegetation is characterized by the general Major Land Resource Area (MLRA) descriptions found in Chapter 3. Existing conditions concerning noxious weeds and other exotic invasive plants are also described in Section 3.2.4.

Actions that physically disturb, degrade, or change the composition of vegetation communities through surface disturbances are considered adverse because they negatively affect the long-term functioning condition of these communities (Allen 1995; Castillo et al. 1997). Surface disturbance would impact vegetation resources to varying degrees, depending on such factors as vegetation type, the type of soils, watershed conditions, topography, location, and the type of surface disturbance and plant reproductive characteristics. Management actions that reduce or curtail surface disturbance and associated adverse impacts to upland vegetation would be considered beneficial.

Actions that increase the risk for the spread of noxious weeds and other exotic invasive plants are considered adverse. Actions that prevent or decrease the risk of spread of noxious weeds and other exotic invasive plants are considered beneficial. The spread of noxious weeds and other invasive plants can be caused by actions such as overland movement of vehicles, livestock, equipment, recreational activities, etc. Soil disturbance facilitates the establishment and spread of noxious weeds, many of which prefer disturbed sites for colonization (Allen 1995; Jacobs et al. 1998; Monsen et al. 2004). Actions that can prevent or decrease the spread of noxious weeds and other exotic invasive plants include avoidance of surface disturbance, vegetation treatments for noxious weeds, and vegetation restoration using native plants.

Climate change has become a serious environmental factor over the past few decades, with increasing temperatures and decreasing precipitation. Climate change toward warming and drying conditions across the American Southwest, including the planning area, is predicted to continue to intensify for the foreseeable future. The climate of the New Mexico already is changing due to global warming and is predicted to become progressively warmer and drier over the foreseeable future (for example, by the U.S. Bureau of Reclamation). Climate change as predicted will have significant impact to upland vegetation communities, causing shifts in vegetation communities upward in elevation, and plant species adapted to relatively cool and moist conditions die out and would be replaced by species adapted to warmer and drier conditions. Such trends have already been documented in forests and woodlands of the Southwest (Allen et al. 2010).

Climate change will likely reduce the efficacy of brush control herbicide treatments over the life of this RMP; grasses may decline because of climate change alone, and shrub control may not be effective at increasing perennial grasses. Shrub control treatment effectiveness will vary across landscapes, soil types, vegetation communities and microclimates in different ways than it has historically. Climate change will likely affect grazing management over the life of this RMP as grass forage and stock water availability decline.

Climate change, including increasing temperatures and decreasing precipitation and changing weather patterns across the Southwest, is likely to have significant effects on most management actions relative to riparian, wetland and upland vegetation resources, especially vegetation, grazing, wildland fire, and travel management. Over the next 20 years, climate change alone already has altered and will continue to alter trends in vegetation composition away from historic climax community composition, and cause shifts in historic vegetation climax communities to communities dominated by more xeric and warmer temperature adapted species (e.g., desert grassland to desert scrub, piñon/juniper woodland to juniper savanna).

4.2.3.1.1 Analysis Methods

Indicators

The following indicator was used for the analysis of management impacts to upland vegetation and noxious weeds:

- Number of acres of surface disturbance resulting from management actions (including mineral development, livestock grazing, and OHVs) across upland vegetation communities, including changes to species composition, vertical structure, and/or successional or seral stages of upland vegetation communities. Such surface disturbance would impact vegetation resources to varying degrees, depending on the amount, location, and type of surface disturbance. Number of acres of surface disturbance associated with various management actions is also used as an indicator for the potential establishment and spread of noxious weeds.

Methods and Assumptions

Management actions associated with the following resources and land uses may result in impacts to upland vegetation resources and are discussed in detail below: karst resources, wildland fire management, land use authorizations, mineral development, livestock grazing, lands with wilderness characteristics, upland vegetation including noxious weeds, fish and wildlife, special status species, soils, recreation, riparian areas, special designations, visual resources, renewable energy, and travel management.

Actions associated with the following resources would not impact upland vegetation because they do not include surface-disturbing activities and are, therefore, not discussed: air resources, paleontological and cultural resources, health and safety, and land tenure.

The following assumptions were used for the analysis of management action impacts on upland vegetation and noxious weeds management:

- Mineral development, and associated surface disturbances, is expected to increase across the planning area over the next 20 years (Engler et al. 2012).
- The degree of impact attributed to any one disturbance or series of disturbances would be greatly influenced by several factors, including existing plant community and specific species composition, location in the watershed, the type, time, and degree of disturbance, precipitation, and mitigating actions applied to the disturbance.
- Both quantitative and qualitative data show overall rangeland health and vegetative communities to be stable and, in some instances, improving. These trends, in part a result of the Restore New Mexico Project, are assumed to continue across the planning area.
- Noxious weeds are those plant species formally listed by the state of New Mexico and separated by classes and are regulated. The term noxious weeds used here also includes other exotic invasive plant species that are not formally listed as noxious weeds, but are ecologically similar. Most are not listed and regulated as noxious weeds because they are already so widespread that regulatory control is not practical. Examples include Russian thistle (*Salsola tragus*), kochia (*Bassia* [formerly *Kochia*] *scoparius*), Lehmann lovegrass (*Eragrostis lehmanniana*), and puncture vine (*Tribulus terrestris*). The environmental impacts of other exotic invasive weeds may be as severe or as worse as some listed noxious weeds.

4.2.3.1.2 Direct and Indirect Impacts

Impacts on upland vegetation, including noxious weeds, would include all management actions that physically disturb or change the composition of vegetation communities and their functioning condition in the planning area. The impacts of management actions on vegetation communities vary, depending on such factors as the type of soils, watershed conditions, wildland fire management, topography, vegetation type, climatic conditions, and plant reproductive characteristics. Impacts to vegetation diversity and species composition would be based on likely changes relative to movement toward the desired plant community (DPC).

Impacts on vegetation communities would result from two categories of management actions: those designed to improve vegetation resources for their ecological values and those directed at other resources but that also indirectly impact vegetation. Direct impacts on vegetation include crushing, trampling, or removing rooted vegetation, resulting in a reduction in plant abundance and diversity, vigor, structure, and/or function of vegetation habitat.

Surface-disturbing activities from management actions would impact the relative abundance and distribution of species within plant communities, as well as facilitate the colonization of bare and disturbed ground by noxious weeds. As stated in Section 3.2.4, within the planning area, invasive plant infestations begin as small patches in disturbed areas such as pipeline and utility corridors, roads, oil and gas locations, undeveloped vehicle trails, range improvement projects, and mining operations.

Other indirect impacts from surface disturbance on vegetation include soil compaction, erosion and sedimentation, changes in hydrology, loss of pollinators and pollinator habitat, and an increased likelihood for weed invasion. Together, these impacts would probably lead to reduced vegetation health and vigor, reduced plant cover, lower plant diversity, habitat fragmentation, and an increased presence of noxious, invasive weed species.

Impacts from Upland Vegetation Management/Noxious Weed Management Actions on Upland Vegetation/Noxious Weeds Management

Vegetation management, including the treatment of noxious weeds, would include the use of herbicides, mechanical techniques (e.g., root plowing), and prescribed fire to reduce shrub cover in treated areas. In general, vegetation treatments have the potential to impact most plant species in similar ways. All vegetation treatments are intended to kill or injure target plants, which may vary in intensity and extent, while providing long-term beneficial impacts to non-target vegetation, including the movement of plant communities towards the DPC and attaining other ecological objectives.

Impacts from Management Common to All

Upland vegetation management actions common to all of the alternatives are composed of several management prescriptions that include the judicious use of herbicides, per the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007b); the continued implementation of rangeland restoration and vegetation treatments for achievement of multi-use management goals; the site-specific use of chemical, mechanical, and prescribed burns to combat woody brush and noxious weeds encroachment; and the rehabilitation of well pads, roads, and ROWs. Additionally, all trees that provide habitat for a migratory bird or a threatened or endangered species would be protected from disturbances, including vegetation treatments.

Impacts to upland vegetation as a result of vegetation treatments would vary, depending on the various biotic and abiotic factors previously discussed and would also depend on which particular vegetation treatment method (mechanical, chemical, or prescribed burn) is applied. Vegetative response to treatments would also be contingent upon the MLRA and associated vegetative communities.

Approximately 67% of the planning area falls within the Southern Desertic Basins, Plains, and Mountains MLRA (see Section 3.2.4.1.1); however, treatments, both chemical and mechanical, have been demonstrated to be ineffective and result in adverse impacts to vegetation communities in desertified landscapes (Schlesinger et al. 1990; Whitford 2002) of southern New Mexico, particularly in regard to the targeting of mesquite (*Prosopis* sp.) (Archer 1994).

Adverse impacts in these landscapes would include alterations in species composition and the temporary removal of woody vegetation, causing increased soil erosion and the potential spread of invasive weedy species, such as Russian thistle. Beneficial impacts of this increased grass cover include reduced raindrop impact, decreased water and wind erosion potential, and increased infiltration. In addition, under all of the alternatives, the BLM would manage appropriately for the vegetative habitat requirements of federally listed species, including the LPC and DSL.

Management prescriptions for these species would include identifying and targeting those areas that are currently designated as unsuitable habitat but have the potential to become suitable habitat. In these parts of the planning area, management prescriptions would be implemented to attain appropriate habitat requirements, reduce fragmentation, enhance connectivity, and move towards the DPC. Also, herbicide treatments would not be implemented in shinnery oak (*Quercus havardii*) communities on dunes that provide potential DSL habitat, which would impart additional beneficial impacts to upland vegetation by helping to maintain natural shinnery oak vegetation communities across the planning area. All of these actions would provide beneficial and enhancement-related impacts to upland vegetation and noxious weed management through management activities focusing on native plant species and their biotic communities, through vegetation restoration and reclamation activities and through the reduction of invasive species establishment and movement towards the DPC. As a result, upland vegetation composition, cover, and production would improve.

Noxious weed and invasive plant management actions common to all would include compliance with EO 13112 and BLM Manual 1745 in restoration, rehabilitation, and reclamation efforts, which would allow non-native plant species to be used in reseeding activities only if native species are not readily available in sufficient quantities or are incapable of maintaining or achieving the properly functioning conditions of biological health. Seed mixes used in these actions would use the closest locally adapted selections, varieties, or cultivars of native species available to improve success of the seeding effort. Operators would also be required to provide an annual report summarizing their noxious weed treatments, as well as provide seed tags prior to seeding disturbed areas. The BLM would follow the management prescriptions provided for in the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007b).

All of these actions would benefit upland vegetation by reducing the potential spread of noxious weeds and invasive species and also by favoring DPC species in upland areas.

Impacts from Management Common to All Action Alternatives

Management Common to All Action Alternatives also includes COAs, BMPs, and other management prescriptions for operators that specifically address the proper methods for minimizing the spread of noxious weeds. The eradication of any non-native noxious weed species that occur as a result of new surface disturbance would be the responsibility of the operator (see Appendix O for a full list of COAs and BMPs addressing noxious weeds). In addition, all action alternatives would include the requirement that any surface-disturbing activity have a plan in place for the control of noxious weeds and invasive species. This would provide beneficial impacts to upland vegetation by minimizing the spread of these noxious and invasive species and reducing competition with native species.

Placement of surface-disturbing activities in established Lehmann lovegrass stands would be avoided. Lehmann lovegrass occurs in low elevation desert grasslands, so impact levels would apply mostly to the Southern Desert Foothills, Southern Plains, and Southern Desertic Basins-Plains and Mountains MLRAs. Prohibiting surface disturbances in areas with Lehmann lovegrass would beneficially impact upland vegetation, as this introduced species is known to be prolific in disturbed areas and would reduce composition and diversity of competing native grasses.

Other Management Prescriptions Common to All Action Alternatives address wildlife stipulations that would prohibit the use of aerial and ground-spraying of herbicide within 100 feet of cave entrances and the use of mechanical or aerial herbicide treatments within 656 feet of active nests (specifically, those nests in mesquite, catclaw acacia (*Acacia greggii*), riparian, and piñon-juniper vegetative communities). Also, the mechanical treatment of saltcedar would be prohibited in known southwestern willow flycatcher (*Empidonax traillii extimus*) occupied habitat. These wildlife stipulations would result in negligible impacts to upland vegetation because the areas targeted would be relatively small and would not affect overall rangeland health and DPC objectives across the planning area.

In addition, all action alternatives would protect any known special status plant species with a 656-foot buffer from any noxious weed treatments. This action would protect special status plant species from direct adverse impacts of noxious weed treatments, but adverse indirect impacts may also occur as a result of

permitting noxious weeds to persist in the immediate proximity (within 656 feet) of special status plants. Indirect adverse impacts, such as increased competition for resources between special status plants and noxious weeds, promotion of additional dispersal of noxious weed seeds into the surrounding landscape, and an increased risk of wildfire, may occur.

Impacts from the No Action Alternative

Under the No Action Alternative, current trends and management activities for vegetation, including noxious weeds management, would continue. This would include the steady increase of noxious weeds, particularly African rue (*Peganum harmala*) and Malta starthistle (*Centaurea melitensis*), across the planning area (see Section 3.2.4.3.1).

Under this alternative, specific sections across the planning area designated for vegetation treatments, including herbicide application, prescribed burns, and mechanical removal, would be solely determined by BLM resource specialists. As a result, impacts to upland vegetation would be more variable, as no specific guidelines for initiating vegetation treatments would be outlined.

Management actions under the No Action Alternative would continue to allow planned surface disturbances in areas of Lehmann lovegrass prevalence, thereby facilitating further growth and expansion of this species. As a result, Lehmann lovegrass stands, which are prolific in disturbed areas (Uchytil 1992), may continue to increase along areas with surface disturbance. This would adversely impact native upland vegetation through displacement and by out-competing them for resources.

Additionally, this alternative has no special restrictions or buffers on herbicide application within areas populated by special status plant species. This would potentially impact any special status plants found in areas treated for noxious weeds by reducing abundance and occurrence localities of these special status species. Other adverse impacts would be expected due to the current trends observed in the spread of noxious weeds across the planning area (see Section 3.2.4.3.1) and lack of updated environmental provisions.

Impacts from Alternative A

Under Alternative A, there would be no establishment of fence buffers during vegetation treatments. This would result in less treated acres, which would equate to less acreage meeting the Standards and Guidelines (BLM 2001a). Vegetation treatments would be implemented in areas where targeted woody species have surpassed specific thresholds (see Chapter 2, Alternatives Matrix for woody species list and their various threshold levels). In addition, there would not be established buffers on herbicide treatments around snake dens. Impacts to upland vegetation would vary depending on the various biotic and abiotic factors previously addressed above and also on which particular vegetation treatment method is applied and would be similar to those impacts described above under Direct and Indirect Impacts.

Under Alternative A, those riparian areas of the Delaware, Black, and Pecos Rivers (and also perennial springs and seeps) would be prioritized for monitoring after vegetation treatments are conducted. This would provide beneficial impacts to vegetation through the maintenance of native plant communities in these areas. Compared to the No Action Alternative, which calls for no prioritization in the monitoring of treated areas, Alternative A would provide greater beneficial impacts by minimizing the spread of noxious weeds across the planning area.

Impacts from Alternative B

Under Alternative B, there would be no establishment of fence buffers during vegetation treatments. Impacts from this management action would be the same as those discussed in Alternative A. Additionally, Alternative B would not reduce brush control actions by target species thresholds and would, therefore, impact fewer acres of target shrub species with lower occurrences or cover than under the No Action Alternative.

Alternative B would also require that no herbicide treatments be applied within 100 feet of known snake dens. Piñon-juniper stands with known bat occupancy would be targeted for treatment at higher than 12 percent vegetative cover. Specific types of impacts would be the same as those described in text under Direct and Indirect Impacts above. Compared to the No Action Alternative, the magnitude of adverse impacts would be less under this alternative due to the additional vegetation management prescriptions.

Under noxious weeds management, the impacts from Alternative B would be the same as those described under Alternative A, because noxious weeds management actions would be the same. Compared to the No Action Alternative, which calls for no prioritization in the monitoring of treated areas, Alternative B would provide greater beneficial impacts to upland vegetation.

Impacts from Alternative C

Under Alternative C, brush control actions would be limited to areas where primary target species would surpass thresholds to achieve DPC, and 20-foot buffers would be established around treatment boundary areas to create fire breaks. Also, no herbicide treatments would be allowed within 100 feet of known special status snake species dens. Specific types of direct and indirect impacts from vegetation treatments would be the same as those described in text under Direct and Indirect Impacts. Compared to the No Action Alternative, the magnitude of adverse impacts would be less under this alternative due to the additional vegetation management prescriptions aimed at achieving DPC.

Impacts from Alternative D

Under Alternative D, impacts to upland vegetation from vegetation treatment would be the same as those under the No Action Alternative because both alternatives would leave the areas designated for treatment up to the discretion of the resource specialist. Vegetation treatments would be buffered 20 feet at treatment boundaries and pasture fences to create natural fire breaks. Specific types of direct and indirect impacts from vegetation treatments would be the same as those described in text under Direct and Indirect Impacts.

Impacts of Soil Resources Actions on Upland Vegetation/Noxious Weeds Management

Upland vegetation and weed management would benefit from soil management objectives across the planning area that maintain or enhance stability and physical function of soils and restrict surface-disturbing activities. In addition, vegetation communities would benefit through special reclamation procedures of disturbed sites, including special site-specific seed mixtures, the planting of trees and shrubs, erosion control, and land treatments. Upland vegetation resources and noxious weeds management would benefit indirectly from the enhanced surface community, which in turn would also reduce the likelihood of noxious weed invasion.

Impacts from Management Common to All

Management common to all decisions would beneficially impact upland vegetation resources and noxious weed management, as all include BMPs designed specifically to prevent soil erosion and runoff. Some of these would include special site-specific seed mixtures, the removal of caliche and other surface materials, soil amendments, soil treatments, and the planting of trees and shrubs.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions listed under Management Common to All Action Alternatives.

Impacts from the No Action Alternative

Under the No Action Alternative, upland vegetation resources and noxious weed management would potentially receive adverse impacts as a result of management stipulations that suggest minimizing erosion and soil loss but do not place precise limits on number of acres or allowable percentage of surface disturbance within oil and gas leases.

In addition, projects may be modified, moved, or mitigated for soil erosion if located on unsuitable areas, defined under this alternative as areas with slopes of 30% or greater.

Impacts from Alternative A

Under Alternative A, surface disturbance stipulations would be in effect within the entire SGSA. Under this alternative, those vegetation communities located within the SGSA would benefit from additional surface protection, as surface disturbances associated with oil and gas leases would not be permitted to exceed 3% of the entire lease acreage or a maximum of 7 acres (whichever is greater).

As with management under the No Action Alternative, surface disturbances are minimized; however, under Alternative A the magnitude of beneficial impacts is greater because it sets specific requirements for the amount of allowable surface disturbance and prohibits surface occupancy in any areas with slopes at 10% or greater, as opposed to the No Action Alternative, which does not prohibit any surface occupancy. The magnitude of beneficial impacts to upland vegetation resources and noxious weeds management is greatest under this alternative.

Impacts from Alternative B

Under Alternative B, surface disturbances would be limited by stipulations only within specific soil mapping units of the SGSA. As in the No Action Alternative, surface disturbances are minimized; however, under Alternative B the magnitude of beneficial impacts is greater because it sets specific requirements for the amount of allowable surface disturbance within specific soil units and prohibits surface occupancy in any areas with slopes at 20% or greater, as opposed to the No Action Alternative which does not prohibit any surface occupancy.

Impacts from Alternative C

Alternative C does not set a percentage or acreage limit on allowable surface disturbance within oil and gas leases, although it does require the use of directional drilling and restrict all new well infrastructure to existing disturbed corridors when applicable. As with Alternative B, Alternative C proposes NSO stipulations in areas with slopes greater than 20% with the additional requirement of an engineered plan for areas with slopes greater than 10%.

These proposed decisions would provide greater beneficial impacts to upland vegetation resources and noxious weeds management compared to the No Action Alternative, but the magnitude of beneficial impacts would be less here than under Alternatives A and B.

Impacts from Alternative D

Compared to all the other alternatives, Alternative D would have the greatest potential adverse impact to upland vegetation resources and noxious weeds management, with no cap on allowable surface disturbance, no requirements to use directional drilling, and a management prescription that would provide the least amount of protection against erosion (avoidance of slopes greater than 30%).

Impacts of Karst Resources Management Actions on Upland Vegetation/Noxious Weeds Management

Karst resource management actions would impact vegetation in circumstances where surface disturbance buffers have been placed around karst features. These actions would directly benefit vegetation communities by protecting them from surface-disturbing activities associated with mineral development and other land uses. Beneficial impacts would include maintaining community composition and plant diversity, minimizing soil compaction and erosion and decreasing the likelihood of noxious weed invasion. The proposed 984-foot surface disturbance buffer proposed for all the action alternatives (Alternatives A–D) as noted in Appendix L would have more direct benefits than under the No Action Alternative where a 656-foot surface disturbance buffer is proposed.

Impacts from Management Common to All

There are no management actions common to all alternatives that would impact upland vegetation/ noxious weeds management because actions listed here mainly address karst detection guidelines, the classification of karst resources across the planning area, and guidance in addressing white nose syndrome.

Impacts from Management Common to All Action Alternatives

All action alternatives would provide for a 984-foot buffer around all known karst features, within which all surface-disturbing activities would be prohibited. This would result in greater protection of the surface vegetation community. Qualitatively, the nature of the impacts to vegetation is the same as those under the No Action Alternative; however, the magnitude of adverse impacts to vegetation would be smaller due to a larger surface disturbance buffer.

There are no other management actions common to all action alternatives that would impact upland vegetation/noxious weed management because the actions listed here pertain to the development of resource management plans for caves and karst resources across the planning area and casing requirements.

Impacts from the No Action Alternative

Under the No Action Alternative, vegetation would benefit from a 656-foot surface disturbance buffer placed around all known cave entrances, passages, or aspects of significant caves or features. This would help to maintain vegetation diversity and abundance within surrounding plant communities.

Impacts of Special Status Species Management Actions on Upland Vegetation/ Noxious Weeds Management

Objectives listed under special status species management include the protection and enhancement of endangered, threatened, and sensitive species habitat. The preclusion of surface-disturbing activities in special status species terrestrial habitats would benefit vegetation communities by minimizing impacts to vegetation abundance and diversity and decreasing the likelihood of erosion and weed invasion, among others.

Impacts from Management Common to All

Under management common to all alternatives, several management prescriptions are proposed that would benefit vegetation and noxious weed management, including the proper use of herbicides as indicated in the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2007b), the adjustment of buffering distances on a case-by-case basis, the preclusion of surface disturbances within 656 feet of active raptor nests, and the prohibition of all surface-disturbing activities on public land with known prairie dog (*Cynomys* sp.) towns. All of these prescriptions would benefit vegetation by placing limitations on surface-disturbing activities.

Impacts from Management Common to All Action Alternatives

Under Management Common to All Action Alternatives, activities are not permitted in threatened, endangered, or sensitive species habitat that would jeopardize their continued existence. For terrestrial species, this would include impacts to habitat resulting from surface-disturbing activities. These prescriptions for protecting habitat would benefit vegetation by maintaining plant community abundance and diversity and minimizing soil erosion, compaction, and likelihood of noxious weed invasion.

Impacts from the No Action Alternative

Under the No Action Alternative, wildlife habitat management prescriptions outlined in the 1988 RMP would continue across the planning area. These include management efforts to restore and/or reclaim habitat in previously developed areas. Habitat restoration would benefit vegetation, as efforts would be made to return species composition to historical settings and would also assist in restoring connectivity between isolated habitat blocks. This would favor greater native plant diversity and abundance and also minimize adverse impacts to vegetation, such as fragmentation, soil erosion, and compaction,

Impacts from Alternative A

Under Alternative A, vegetation treatments adjacent to special status plant species and habitats would be prioritized. Impacts would vary depending on prioritization criteria and implementation. The treatment of noxious and invasive species would ultimately provide beneficial impacts to native species in treatment areas that may have previously been out-competed by noxious and invasive species.

This alternative would provide greater beneficial impacts compared to the No Action Alternative, which does not provide any guidance on vegetation treatments adjacent to special status plant species and habitats.

Impacts from Alternatives B, C, and D

Impacts under Alternatives B, C, and D would be exactly the same because proposed management prescriptions are identical. Under these three alternatives, proposed management calls for the avoidance of vegetation treatments adjacent to special status plant species. Impacts to vegetation would vary and depend on the characteristics and plant community composition within these adjacent areas. Vegetation in those adjacent areas with prevalent noxious and invasive weeds would receive adverse impacts as plant diversity and native plant abundance would decrease.

Compared to the No Action Alternative, which provides no guidance on vegetation treatments adjacent to special status plant species, impacts may vary and would be contingent upon decisions made by BLM land managers.

Impacts from Riparian/Water Resource Actions on Upland Vegetation/Noxious Weed Management

The goals and objectives of riparian management actions include the restoration of degraded riparian vegetation communities in order to move riparian areas towards proper functioning condition (PFC), all of which would favor greater plant species abundance, diversity, and ecosystem functionality. This would provide indirect beneficial impacts to upland vegetation by reducing the likelihood of noxious weeds invasion and contributing to greater long-term landscape stability and movement towards DPC.

Impacts from Management Common to All

Under management actions common to all alternatives, all surface disturbances, with the exception of riparian enhancement projects, are prohibited in riparian areas and annual biological surveys would be conducted to assess riparian health. The 1997 stipulations on springs would remove livestock, OHVs, and minerals activities from riparian areas, greatly reducing the potential for spread of noxious weeds.

These management actions would reduce adverse impacts to riparian areas and associated vegetation and also reduce the presence and spread of noxious weeds, especially saltcedar. This would provide indirect beneficial impacts to upland vegetation and noxious weeds management as those described above.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, restoration of riparian areas would be prioritized on an as needed basis, resulting in better management and reduced direct adverse impacts to riparian vegetation. This would reduce adverse impacts from noxious weeds, especially saltcedar, and contribute to an indirect increased shift towards DPC for upland vegetation.

Proposed riparian management actions under the action alternatives mainly address the restoration of riparian areas and the restriction of surface-disturbing activities around playas, seeps, and spring headwaters. Buffers placed around springs and playas would provide indirect beneficial impacts to upland vegetation.

Impacts from the No Action Alternative

Under the No Action Alternative, current riparian/wetlands management would continue. Standard conditions used for determining feasibility of saltcedar management, such as location and density of saltcedar stands, available budget and staff to conduct treatments and management objectives, would remain intact under this alternative. Additionally, all stipulations on springs and seeps recorded in the 1997 Amendment to the RMP, including avoidance of future ROW actions, removal of livestock, and implementation of a 656-foot surface disturbance buffer around springs, seeps, and downstream from riparian areas would be carried forward, thus minimizing the spread of noxious weeds.

Impacts from Alternative A

Under Alternative A, restoration of riparian areas would be prioritized on an as needed basis, which would result in better management and would reduce indirect adverse impacts to upland vegetation and noxious weeds management compared to the No Action Alternative. Restoration actions would result in less presence and spread of noxious weeds, especially saltcedar.

Alternative A would protect moderately and highly productive playas and riparian vegetation around and on playas with a 656-foot surface disturbance/occupancy buffer and a 0.25-mile buffer for certain oil, gas, and minerals activities (see Minerals Actions section, above). Low productivity playas would have 328-foot buffers. Such actions would limit the spread of noxious weeds within the vegetation of playas by removing the direct impacts of surface-disturbing activities within playas. Alternative A would also include planting of native vegetation in riparian areas. There would also be a 984-foot surface disturbance buffer for seeps and spring headwaters, further reducing the spread of noxious weeds in riparian areas.

The magnitude of beneficial impacts would be greater under this alternative, compared to the No Action Alternative, which does not provide management stipulations for playas and only requires a 656-foot surface disturbance buffer around seeps and springs. The potential for noxious weeds to spread and colonize would be reduced under this alternative.

Impacts from Alternative B

Under Alternative B, riparian restoration and seeps, springs, and playa buffers would be the same as Alternative A, except that riparian restoration would be prioritized for the Delaware River, springs, the Pecos River, and the Black River, in that order. Grazing would not be allowed in the Black River Management Area, riparian spring areas, within 656 feet of the banks of the Black River on public land outside the Black River Management Area. Dormant season grazing use would be allowed along the Delaware River. Restrictions on OHV use and livestock grazing in springs and seeps would be the same as those described under the No Action Alternative. These actions would help reduce the spread of noxious weeds near playas, seeps, and springs by reducing surface disturbance and would also contribute to DPCs in these areas.

The magnitude of beneficial would be greater under this alternative, compared to the No Action Alternative, which does not provide management stipulations for playas and only requires a 656-foot surface disturbance buffer around seeps and springs.

Impacts from Alternative C

Alternative C would prioritize riparian restoration on an as needed basis like Alternative A. Alternative C would also provide a 656-foot surface disturbance buffer to all playas instead of making the buffer size dependent upon the productivity level of the playa. There would also be an approximately 984-foot surface disturbance buffer for seeps or spring headwaters. Because of the limitations on surface disturbance, all of these management actions would reduce the risk of the spread of noxious weeds in these areas. Seasonal livestock grazing would still be allowed in the Delaware and Pecos River riparian areas if the riparian area associated with the allotment is at PFC.

The magnitude of beneficial impacts would be greater under this alternative, compared to the No Action Alternative, which does not provide management stipulations for playas and only requires a 656-foot surface disturbance buffer around seeps and spring headwaters. Qualitatively, this would be the same

impact as described under the No Action Alternative because, in the case of the buffers around seeps and springs, the same type of management action would apply. However, the magnitude of adverse impacts would be smaller due to the greater surface disturbance buffer size.

Impacts from Alternative D

Alternative D would prioritize the establishment of native riparian plants. It would have the same livestock grazing-related protection for riparian areas, as well as the same springs and seeps protections, as those described under Alternative A. Thus, these management actions would have the same impacts as those described under Alternative A.

Unlike the No Action Alternative, however, Alternative D proposes a 656-foot surface disturbance buffer around all playas. This would result in greater beneficial impacts compared to the No Action Alternative, such as minimizing the potential spread of noxious weeds.

Impacts of Wildland Fire and Fuels Management Actions on Upland Vegetation/ Noxious Weeds Management

Impacts from wildland fire management actions may result in a wide range of both direct and indirect impacts to upland vegetation depending on various factors, including departure from historic fire regime reference conditions, type of fire management activity (suppression, management of wildfire to meet resource objectives, prescribed fire) and vegetation type and structure. Prescribed burns would have short-term adverse impacts on upland vegetation by potentially reducing native plant species diversity and thinning out non-target DPC species. Long-term benefits, however, would accrue as the once native or desirable non-native vegetation becomes re-established. Other beneficial long-term impacts would include a more varied habitat structure, multiple age-classes, and openings for forb species recruitment.

Impacts from Management Common to All

Management actions common to all alternatives would include planning and coordination among agencies to restore 19,500 acres to within their historic fire regime reference conditions and to reduce the amount of fuels and also aid in the thinning of trees in overgrown forests. Tree thinning and prescribed burns would be used to manage forests and woodlands. Implementation-level NEPA actions and an approved burn plan would be required before any prescribed fire takes place. Updates to the Fire Management Plan (FMP) would be applied annually or as needed to ensure wildfire suppression priorities and RMP decisions are being effectively implemented.

Impacts from wildland fire management actions would generally be beneficial to upland vegetation communities given that past wildfire suppression has led to overgrown stands of trees and excessive fire fuels over the past century, resulting in high-severity and environmentally catastrophic wildfires. Use of prescribed fire and tree thinning in coniferous forests and woodlands have beneficial impacts to upland vegetation communities in vegetation types where wildfire historically was an important ecological factor maintaining native plant communities, where forests and woodlands are now overgrown from a century of fire suppression, and where native plant species are fire adapted (Allen et al. 2001; Fulé et al. 2001; Troendle et al. 2010). Direct impacts to upland vegetation would include the reduction of conifer forest stand densities, which would be beneficial to the remaining trees and other upland vegetation. Tree thinning would reduce competition among remaining trees for soil, water, and other resources. Remaining stands should be healthier and more resistant and resilient to drought and wildfire impacts. Forest thinning also would enhance other vegetation by opening habitat and resources for herbaceous understory vegetation and increasing the canopy cover, density, and species diversity of understory vegetation.

Additionally, all equipment would be washed prior to entering treatment areas to reduce the potential spread of noxious weeds. Emergency stabilization and rehabilitation actions following wildfires would enhance post-wildfire vegetation recovery. Overall, wildfire management actions would increase the potential for forested upland vegetation communities to trend toward and achieve DPC status.

Impacts from Management Common to All Action Alternatives

All action alternatives would include provisions for working with federal, state, and local partners to identify high priority areas for fuels treatments to reduce high-severity wildfire risk. Fire suppression activities in all SMAs would be managed in accordance with OHV designations. Restrictions on OHV use would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants All action alternatives would protect riparian areas and floodplains by prohibiting the use of applied management prescriptions (prescribed fire included) to take vegetation down to soil or completely consume the vegetation. This would beneficially impact upland vegetation by minimizing soil erosion and sedimentation but may create more long-term adverse impacts if non-native, invasive riparian species, such as saltcedar, are allowed to spread.

Additionally, all action alternatives would avoid prescribed fire within either 0.5 or 1 mile of known bat roosts, which would increase the threat of high-severity wildfire and its impact in these areas.

Impacts from the No Action Alternative

Under the No Action Alternative, current fire management strategies would continue in the planning area. Within the planning area approximately 19,500 acres per year would be treated with prescribed fire. The amount of area to be treated may vary depending on annual rainfall. See the 2004 *Resource Management Plan Amendment for Fire and Fuels Management on Public Land in New Mexico and Texas* (BLM 2004a). Impacts affecting the potential spread of noxious weeds would be the same as those described under Impacts from management common to all except that prescribed fire would not be used to manage saltcedar in riparian areas. By prohibiting prescribed fire as a management tool for saltcedar in riparian areas, the spread of this species would be minimized.

Impacts from Alternative A

Under Alternative A, prescribed fire would not be permitted within 1 mile of known occupied bat roosts from March through August. This would result in smaller areas being treated with prescribed fire and would have indirect adverse effects on upland vegetation communities, as those described at the beginning of this section. A reduction in use of prescribed fire for fuels reduction would have indirect adverse effects on the spread of noxious weeds by increasing the probability of high-severity wildfire.

Compared to the No Action Alternative, which has no restrictions on prescribed burns within areas with occupied bat roosts, the magnitude of beneficial impacts to upland vegetation would be greater than under Alternative A because a greater number of acres would be open for prescribed burn treatments, which would ultimately impart long-term benefits to upland vegetation, as those described at the beginning of this section.

Impacts from Alternative B

Under Alternative B, prescribed fire would not be permitted within 1 mile of known occupied bat roosts from March through August. This would result in smaller areas being treated with prescribed fire and would have indirect adverse effects on upland vegetation communities. This would impart long-term benefits to upland vegetation, as those described at the beginning of this section.

Compared to the No Action Alternative, which has no restrictions on prescribed burns within areas with occupied bat roosts, the magnitude of beneficial impacts to upland vegetation would be greater than under Alternative B because a greater number of acres would be open for prescribed burn treatments. This would impart long-term benefits to upland vegetation, as those described in Impacts from Management Common to All. Wildland fire and fuels management would have the same impacts to the spread of noxious weeds as those described under Alternative A, because the management actions would be the same.

Impacts from Alternative C

Under Alternative C, prescribed fire would not be permitted within 0.5 mile of known occupied bat roosts from March through August. This would result in smaller areas being treated with prescribed fire and would have indirect adverse effects on upland vegetation communities, as described under Impacts from

Management Common to All. Wildland fire and fuels management would have the same impacts to the spread of noxious weeds as those described under Alternative A, because the management actions would be the same.

Compared to the No Action Alternative, which has no restrictions on prescribed burns within areas with occupied bat roosts, the magnitude of beneficial impacts to upland vegetation would be greater than under Alternative C because a greater number of acres would be open for prescribed burn treatments. This would impart long-term benefits to upland vegetation, as described at the beginning of this section.

Impacts from Alternative D

Under Alternative D, prescribed fire would not be permitted within 0.5 mile of known occupied bat roosts from March through August. This would result in smaller areas being treated with prescribed fire and would have indirect adverse effects on upland vegetation communities, as described under Impacts from Management Common to All. Wildland fire and fuels management would have the same impacts to the spread of noxious weeds as those described under Alternative A, because the management actions would be the same.

Compared to the No Action Alternative, which has no restrictions on prescribed burns within areas with occupied bat roosts, the magnitude of beneficial impacts to upland vegetation would be greater than under Alternative D because a greater number of acres would be open for prescribed burn treatments. This would impart similar long-term benefits to upland vegetation as those described at the beginning of this section.

Impacts of Livestock Grazing Actions on Upland Vegetation/Noxious Weeds Management

Domestic livestock grazing may result in adverse impacts to native vegetation communities in arid and semiarid environments of the Southwest (Pieper 1994; Jones 2000) if livestock stocking rates, rotation schemes and utilization levels are not properly managed. Despite proper management, adverse impacts may still occur, though to a lesser degree. Direct adverse impacts could include the selective removal of preferred plant species (generally perennial grasses), soil compaction and increased erosion, contamination of adjacent water bodies, trampling of vegetation, and the potential spread of noxious weeds and other invasive species through equipment, feed products, and on livestock themselves. Indirect adverse impacts may include reduced vegetation cover and increased soil exposure changes in species community diversity and composition, where species that are not preferred by livestock have a competitive advantage over those species preferred by livestock. In addition, those species that are better adapted to trampling and soil compaction would be favored over those species that are not.

Livestock grazing impacts may be minimized by adjusting the densities and movement of livestock to coincide with the optimal grazing tolerance, including species composition and seasonal status of particular plant communities. Grazing management actions that reduce grazing would be the most beneficial to upland vegetation communities. Adaptive grazing management prescriptions may lessen the adverse impacts to upland vegetation communities. Goals of livestock grazing management are to achieve meeting the Standards and Guidelines (BLM 2001a), and to trend upland vegetation communities toward DPC. Grazing intensity would not exceed 45% utilization of total annual plant production.

The number of acres open and closed to livestock grazing varies by alternatives and is presented in Table 4-23.

Table 4-23. Management Acreages Open and Closed to Livestock Grazing by Alternatives

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
Closed	5,226	493,120	153,583	8,115	3,594

Impacts from Management Common to All

Livestock grazing management actions common to all alternatives would include restrictions such as utilization levels not exceeding 45%, fences, exclosures, rest periods, changes in seasons of use, and changes in stocking rates, all of which would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Management actions would also include the use of consultation, coordination, range survey data, and resource monitoring when making livestock use adjustments, all of which could help identify and reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Other management actions that could help identify and reduce the potential for impacts to upland vegetation include allotment-specific objectives, interdisciplinary development and review of proposed actions, and reduction in livestock concentrations in special status species habitat. Vegetation treatments would also be conducted as part of rangeland improvements, which would reduce the spread of noxious weeds and invasive plants in upland vegetation.

Impacts from Management Common to All Action Alternatives

All action alternatives would avoid placing livestock infrastructure in archaeological districts. Fences may be allowed to cross segments of archaeological districts in areas where previous disturbance has occurred after consultation with the New Mexico State Historic Preservation Office (SHPO). Reduced livestock grazing would minimize trampling and direct loss of vegetation, decrease the potential for soil erosion and compaction, and reduce the spread of noxious weeds and invasive plants in these areas. Other grazing management action impacts to upland vegetation and noxious weeds common to all action alternatives would be the same as those described above.

Impacts from the No Action Alternative

Under the No Action Alternative, current management would continue, including the authorization of approximately 350,000 AUMs to 200 permittees and approximately 18,000 AUMs to 62 lessees. These numbers would be supported by quantitative field monitoring, and any future increase or decrease in authorized numbers would need to be backed with similar data. The types of direct and indirect impacts that would be expected would be the same as those described above.

As shown in Table 4-23, under the No Action Alternative, approximately 2,089,107 acres would remain open and 5,226 acres would remain closed to livestock grazing. Thus, upland vegetation on these acres open to livestock grazing would potentially receive adverse impacts as those described above.

Impacts from Alternative A

Alternative A would reduce the total number of acres open to livestock grazing and authorized AUMs would also be reduced by a 10%, which would reduce the direct and indirect adverse impacts to upland vegetation caused by grazing activities. The types of direct and indirect impacts that would be expected would be the same as those described above.

As shown in Table 4-23, Alternative A would have approximately 1,598,198 acres open to livestock grazing and 493,120 acres closed to livestock grazing. This represents a substantial increase in the number of acres closed to grazing, compared to the No Action Alternative. Thus, the magnitude of adverse impacts to upland vegetation from livestock grazing under Alternative A would be smaller than those impacts under the No Action Alternative due to the greater number of acres closed to grazing.

Increased vegetation from restoration efforts, as well as any suspended or inactive AUMs, would be allocated to watershed and wildlife use. This would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Livestock use would also be deferred in pastures following vegetation treatments until certain monitoring criterion are met, which would also help reduce impacts to upland vegetation, such as trampling and loss of vegetation, soil compaction, increased soil erosion, and the spread of noxious weeds and invasive plants, during the period that grazing is deferred.

Impacts from Alternative B

Compared to the No Action Alternative, Alternative B would reduce the total number of acres open to livestock grazing, which could reduce the direct and indirect adverse impacts to upland vegetation caused by grazing activities. However, Alternative B would authorize the same number of AUMs and have the same monitoring requirements as the No Action Alternative. The types of direct and indirect impacts that would be expected would be the same as those described above.

As shown in Table 4-23, under Alternative B, approximately 1,937,725 acres would be open to livestock grazing and 153,583 acres would be closed. This represents a substantial increase in the number of acres closed to grazing, compared to the No Action Alternative. Thus, the magnitude of adverse impacts to upland vegetation from livestock grazing under Alternative B would be smaller than those impacts under the No Action Alternative due to the greater number of acres closed to grazing.

Increased vegetation from restoration efforts would be allocated to watershed and wildlife use in the LPC, DSL, and aplomado falcon areas. Vegetation would go to livestock use in all other areas. All increased forage/cover would be allocated to watershed and wildlife resources. Half of any suspended or inactive AUMs would also be retired and dedicated to watershed health. Any areas of upland vegetation, areas that are dedicated to watershed or wildlife use, and areas retired from livestock use would be less prone to impacts such as crushing and the spread of noxious weeds and invasive plants. Livestock use would also be deferred for a minimum of two growing seasons following treatments, and longer if the BLM determines that additional rest is needed from monitoring results. Reduced livestock grazing during this period would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Impacts from Alternative C

Compared to the No Action Alternative, Alternative C would reduce the total number of acres open to livestock grazing, which could reduce the direct and indirect adverse impacts to upland vegetation caused by grazing activities. However, Alternative C would authorize the same number of AUMs and have the same monitoring requirements as the No Action Alternative. The types of direct and indirect adverse impacts that would be expected would be the same as those described above.

As shown in Table 4-23, under Alternative C, approximately 2,083,232 acres would be open to livestock grazing and 8,115 acres would be closed. This represents an increase in the number of acres closed to grazing, compared to the No Action Alternative. Thus, the magnitude of adverse impacts to upland vegetation from livestock grazing under Alternative C would be smaller than those impacts under the No Action Alternative due to the greater number of acres closed to grazing.

A total of 16,660 AUMs that are currently inactive or in suspension would be made available to the authorized permittee when resource conditions and vegetation monitoring show that the AUMs can be supported. Retired AUMs would be made available to any applicant who meets the mandatory qualifications and base property requirements set by federal regulations. Allowing livestock grazing in these areas would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

All increased forage/cover would be allocated to watershed and wildlife resources, which would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Livestock use would be deferred for a minimum of two growing seasons following all treatments. However, if monitoring criteria is met then the pasture could be grazed sooner. The potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants would be reduced while livestock use is deferred, but would be increased when grazing commences.

Impacts from Alternative D

Alternative D would increase the total number of acres open to livestock grazing, which could increase the direct and indirect adverse impacts to upland vegetation caused by grazing activities. However, Alternative D would authorize the same number of AUMs and have the same monitoring requirements as the No Action Alternative. The types of direct and indirect adverse impacts that would be expected would be the same as those described above.

As shown in Table 4-23, under Alternative, approximately 2,087,759 acres would be open to livestock grazing and 3,594 acres would be closed. This represents a slight increase in the number of acres closed to grazing, compared to the No Action Alternative. Thus, the magnitude of adverse impacts to upland vegetation from livestock grazing under Alternative C would be smaller than those impacts under the No Action Alternative due to the greater number of acres closed to grazing.

A total of 16,660 AUMS that are currently inactive or in suspension would be made available to the authorized permittee when resource conditions and vegetation monitoring show that these AUMs can be supported. Retired AUMs would be made available to any applicant who meets the mandatory qualifications and base property requirements set by federal regulations. All increased vegetation from restoration efforts would be allocated to livestock. Allowing livestock grazing in these areas would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

All increased forage/cover would be allocated to watershed and wildlife resources, which would also reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Livestock use would be deferred for one growing season after vegetation treatments, which would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants during this time.

Impacts of Land Use Authorization Actions on Upland Vegetation/Noxious Weeds Management

Land use authorizations generally include a number of activities and features, such as access roads, transmission lines and pipelines, and their ROWs that would result in surface disturbances and vehicle and equipment transportation, both of which could contribute to adverse impacts to vegetation and the spread of noxious weeds. Potential impacts would include direct loss of vegetation and topsoil, reduced plant diversity, habitat fragmentation, soil compaction, and increased erosion and increased likelihood of noxious weed invasion. Additional impacts to soils and native vegetation would be perpetuated over time by maintenance activities for those features, although mitigation and BMPs in place would help alleviate adverse impacts.

Those areas that are classified as ROW avoidance, exclusion, or open areas would minimize surface disturbances and, therefore, beneficially impact vegetation. The number of acres under each of these categories varies across the alternatives and is depicted in Table 4-24.

Table 4-24. Right-of-way Avoidance, Exclusion, and Open by Alternatives (acres)

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540
Open	2,051,927	798,544	757,380	1,610,692	1,749,782
Total	***2,089,949***	***2,089,731***	***2,089,735***	***2,089,689***	***2,089,682***

Impacts from Management Common to All

Under management common to all alternatives, minor ROWs would be considered in exclusion and avoidance zones on a case-by-case basis. Impacts to vegetation would vary depending on areas under consideration and decisions made by land managers. Generally, the fewer the number of acres managed for ROWs, the less potential for adverse impacts to vegetation and the spread of noxious weeds and

invasive plants. In addition, ROWs would be granted only after site-specific analysis and terms and conditions of ROW grants would depend on the sensitivity of the affected resources and applicable laws and regulations established to protect them.

New surface disturbance in dune complexes would not be authorized within DSL habitat. Exceptions to this requirement would be considered based on the proposed surface use and proposed mitigations. By reducing surface-disturbing activities in DSL habitat, plant community composition would remain intact and the potential for the spread of noxious weeds and invasive plants would be reduced.

Whenever possible, facilities would be confined to existing alignments, minimizing width requirements and maximizing multiple occupancy, thereby reducing additional surface disturbance and associated impacts to vegetation and also minimizing the spread of noxious weeds and invasive species.

Impacts from Management Common to All Action Alternatives

Under management common to the action alternatives, all projects for which allocations for land use authorizations are not specified as avoidance or exclusion would be open to consideration of granting ROWs subject to site-specific analysis and stipulations applied at the project level. The degree of impact on vegetation and noxious weed management would vary, depending on the project, its location, and the plant composition of the area.

Additionally, under all of the action alternatives permanent pipelines greater than 4 inches in diameter or greater than 125 pounds per square inch (psi) would be buried with exceptions made for pipeline burial in particular soil types (limestone hills, shallow sites) that would be deemed impractical.

Impacts from the No Action Alternative

Under the No Action Alternative, current management pertaining to land use authorizations would continue, as specified in the guidelines in Appendix 2 of the 1997 Carlsbad RMP Amendment. Approximately 184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. A total of 30,965 acres, primarily within SMAs, would remain designated as “avoidance” areas. Approximately 7,056 acres would be designated as exclusion and approximately 2,051,927 acres would remain open (see Table 4-24). Adverse impacts to upland vegetation and noxious weed management, as those described at the beginning of this section, would continue as ROW applications are granted. Mitigation and remediation actions in place, however, would help minimize these impacts.

Under this alternative, any pipelines greater than 4 inches in diameter and any lines with a pressure greater than 125 psi would be buried. The decision to bury pipelines less than 4 inches in diameter would be made on a case-by-case basis. Additionally, terms and conditions of ROW grants would depend on the sensitivity of the affected resources and existing laws and regulations already established to protect them.

Impacts from Alternative A

This alternative proposes the requirement of third-party compliance monitoring on all new ROW construction and reclamation activities throughout the planning area. Compared to the No Action Alternative, which does not require compliance monitoring, the potential risk of adverse impacts as a result of negligence and non-compliance with ROW development stipulations would be reduced. Also, under Alternative A, 629,149 acres would be designated as avoidance and 662,038 as exclusion. Approximately 798,544 acres would remain open across the planning area (see Table 4-24). Compared to the No Action Alternative, which has 7,056 acres designated as exclusion and proposes a 95% decrease in acres designated as avoidance areas, the magnitude of and potential for adverse impacts to upland vegetation and noxious weed management, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Stipulations under Alternative A would reduce potential risks resulting from leakage, spills, and subsequent contamination by requiring leak detection and automatic shut-off systems on all hydrocarbon and saltwater pipelines/storage facilities located across the planning area. The No Action Alternative does not propose any similar stipulations and, therefore, poses greater risks of leakage, spills, and contamination of upland vegetation resources in comparison with Alternative A.

Impacts from Alternative B

This alternative proposes the requirement of third-party compliance monitoring on all new ROW construction and reclamation activities throughout the planning area. Compared to the No Action Alternative, which does not require compliance monitoring, the potential risk of adverse impacts as a result of negligence and non-compliance with ROW development stipulations would be reduced. Also, under Alternative B, 413,654 acres would be designated as avoidance and 918,701 acres as exclusion. Approximately 757,380 acres would remain open across the planning area (see Table 4-24). Compared to the No Action Alternative, which has a much lower exclusion acreage designated and proposes a 92% decrease in acres designated as avoidance areas, the magnitude of and potential for adverse impacts to upland vegetation and noxious weed management, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Stipulations under Alternative B would reduce potential risks resulting from leakage, spills, and subsequent contamination by requiring leak detection and automatic shut-off systems on all hydrocarbon and saltwater pipelines/storage facilities. The No Action Alternative does not propose any similar stipulations and, therefore, poses greater risks of leakage, spills, and contamination of upland vegetation resources in comparison with Alternative B.

Impacts from Alternative C

Under this alternative, third-party compliance monitoring would be required only in situations where operators have a documented history of non-compliance. Qualitatively, the impact as described under Alternative A would be the same; however, the potential for adverse impacts is greater due to reduced monitoring of ROW development activities. Also, under Alternative C, 313,619 acres would be designated as avoidance and 165,378 as exclusion. Approximately 1,610,692 acres would remain open across the planning area (see Table 4-24). Compared to the No Action Alternative, which has 7,056 acres designated as exclusion and proposes a 90% decrease in acres designated as avoidance areas, the magnitude of and potential for adverse impacts to upland vegetation and noxious weeds management, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Stipulations under Alternative C would reduce potential risks from leakage, spills, and subsequent contamination by requiring leak detection and automatic shut-off systems on all hydrocarbon and saltwater pipelines/storage facilities located across the planning area. The No Action Alternative does not propose any similar stipulations and, therefore, poses greater risks of leakage, spills, and contamination of upland vegetation resources in comparison with Alternative C.

Impacts from Alternative D

Potential for impacts would be greatest under Alternative D, which would not require compliance monitoring in relation to ROW construction and reclamation activities across the planning area. Also, under Alternative D, 270,360 acres would be designated as avoidance and 69,540 as exclusion. Approximately 1,749,782 acres would remain open across the planning area (see Table 4-24). Compared to the No Action Alternative, which has 7,056 acres designated as exclusion and proposes an 88% decrease in acres designated as avoidance areas, the magnitude of and potential for adverse impacts to upland vegetation and noxious weed management, as those described above, would be smaller under this alternative. Qualitatively, the impacts would be the same.

Under Alternative D, leak detection and shut-off systems would not be required, thereby increasing the possibility of greater contamination if leaks or spills should occur. Adverse impacts would be the same as those under the No Action Alternative, which also does not require leak detection or shut-off systems.

Impacts of Travel Management and Recreation Management Actions on Upland Vegetation/Noxious Weeds Management

For ease, travel management and recreation have been combined since the primary impact for both is from OHVs. The use of OHVs on areas designated as open to travel would potentially contribute to the spread of noxious weeds as native vegetation becomes more susceptible to trampling. Increased risk of wildfire associated with human activity also would increase with more recreation (especially campfires) activity in upland areas, resulting in the spread of noxious weeds.

OHVs have adverse impacts on vegetation, and wherever OHVs operate, adverse impacts to vegetation would occur (Webb and Wilshire 1983; Ouren et al. 2007). Increased risk of wildfire associated with human activity also would increase with more recreation (especially campfires) activity in upland areas. Designation of WSAs would close those areas to OHVs and would be beneficial to upland vegetation. Equestrian recreation activities have similar adverse impacts to vegetation, but would be largely limited to trail margins. Direct impacts to upland vegetation would be from OHVs that directly crush and destroy vegetation. Human caused wildfire would directly destroy vegetation, and removal of woody vegetation for campfire fuel would destroy woody vegetation. Equestrian trails would cause adverse impacts to corridor vegetation from trampling and grazing and browsing. Indirect impacts from travel and recreation would primarily be physical impacts to soils and loss of existing plants from OHVs will create disturbance conditions that would favor establishment and spread of invasive weeds. Equestrian activities could spread invasive and noxious weeds from contaminated livestock feed (hay). However, the use of certified weed-free hay would be required in all equestrian-oriented SRMAs and ERMAs.

The majority of OHV activities would be in desert areas with sand dunes and playas in the Southern High Plains MLRAs. The vegetation of those areas is particularly sensitive to impacts and lacks resiliency for recovery. OHV actions would have even more adverse impacts to upland vegetation in those MLRAs than other MLRAs of the planning area. Impacts from campfire and equestrian actions would conversely be greatest in woodland and forested areas of the Arizona/New Mexico Mountains MLRA, and riparian areas of low-elevation MLRAs, but riparian management is addressed in another section below. Table 4-25 provides acreages that would be limited or closed to OHV use across alternatives over the entire planning area.

Table 4-25. Travel Management Allocations (acres) by Alternatives

OHV Restrictions	No Action	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737

Impacts from Management Common to All

Under management common to all alternatives, RAMPs would be prepared for all designated SRMAs. These plans would address levels and types of management actions necessary to achieve the recreation objectives in the RMP.

Additionally, The Black River SRMA (1,275 acres) would be a ROW exclusion area and would be closed to salable mineral development activities, which would reduce the potential for impacts to upland vegetation because surface disturbance from ROWs and mineral development would not occur. OHV and equestrian use would also not be allowed in the SRMA, which would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

The Conoco Lake SRMA (7 acres) would prohibit firewood collection and allow fires in grills only (subject to fire restrictions), which would help reduce the potential for wildfire in upland areas. The SRMA would also be a ROW exclusion area, which would reduce impacts to upland vegetation caused by ROW-related surface disturbance,

The Dunes RMZ would have an NSO stipulation on active dunes and developed areas for future leases, which would reduce impacts to upland vegetation from surface disturbance caused by minerals development. It would also be managed as a ROW exclusion area on dunes and a ROW avoidance area elsewhere. The fewer the acres managed for ROW, the less potential for impacts to upland vegetation from ROW-related surface disturbance.

The Trails RMZ would limit travel to existing routes and expand routes on a case-by-case basis. The fewer the number of trails present, the less potential for adverse impacts to upland vegetation, such as crushing, compaction, and the spread of noxious weeds and invasive plants. The area would be managed as open with moderate constraints for leasable development and open with special terms and conditions for salable development, so the fewer the number of acres managed for mineral exploration and development, the less potential for adverse impacts to upland vegetation from surface disturbances caused by these activities.

Phantom Banks Heronries would be designated as limited to OHV use and a plan would be implemented to protect active heronries through seasonal limitations to designated routes. Emergency OHV limitations may also be imposed in problem areas. Restrictions on OHV access would reduce the potential for the impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Within the planning area, motorized wheeled cross-country travel would be allowed for any military, fire, search and rescue, or law enforcement vehicles used for emergency purposes. Allowing motorized access would increase the potential for adverse impacts to upland vegetation, such as crushing, soil compaction, reduced vegetation health and vigor, and the spread of noxious weeds and invasive plants.

Motorized wheeled cross-country travel for lessees and permittees would be limited to the administration of a BLM lease or permit. Lessees and permittees would not be allowed to drive cross-country for the purposes of hunting, fishing, recreation, or other purposes not directly related to the administration of their federal permit or lease. Restrictions on motorized travel would reduce the potential for adverse impacts to upland vegetation, such as those previously described.

Management actions common to all that would not affect upland vegetation include actions that focus on other resources, such as public safety protections (e.g., OHV flags and signage), NSO on bike trails, VRM objectives, restrictions on weapons, restrictions on swimming, restrictions on fishing, restrictions on pets, sound restrictions, boating restrictions, and protection of cultural and paleontological resources.

Impacts from Management Common to All Action Alternatives

Camping would be prohibited within 900 feet of any natural or human-made water source (excluding the Pecos River). Limiting camping access could help reduce impacts to upland vegetation, such as trampling, crushing and the spread of noxious weeds and invasive plants, where applicable.

Roads would be constructed and maintained per BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development - The Gold Book* (BLM 2007a). Properly constructed and maintained roads would reduce the potential for impacts to upland vegetation from surface disturbance caused by road construction.

Trails would be designated within the Black River SRMA, including extending trails to Ladder Hole from the parking area. These trails would be for non-motorized use only. Increasing the number of trails would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. However, restrictions on motorized use would help limit the potential for impacts to upland vegetation caused by OHVs, such as crushing and the spread of noxious weeds and invasive plants.

Hackberry Lake would be managed as an SRMA. Other uses would be subject to the existing COAs in place to protect the OHV user recreational experience (e.g., burying surface pipelines under existing trails). This alternative would look to create new trails and facilities for the OHV user experience. Increasing the number of OHV trails would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Trails in the La Cueva SRMA (1,565 acres) would be limited to non-motorized use only (43 CFR 8341.1). Restrictions on motorized use would help reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. The SRMA would be designated as open

to ROWs under all alternatives but Alternative B where it would be an exclusion area. The fewer the acres managed for ROW, the less potential for impacts to upland vegetation from ROW-related surface disturbance. It would be managed with default mineral allocations. The fewer the acres managed for mineral exploration and development, the less potential for impacts to upland vegetation from surface disturbance caused by these activities. The SRMA would also be open to grazing, which would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Impacts from the No Action Alternative

As shown in Table 4-25, under the No Action Alternative, approximately 2,035,307 would be managed as OHV limited. Approximately 55,966 acres would remain closed. The types of direct and indirect impacts that would be expected in areas of OHV use are described at the beginning of this section.

Management actions regarding campfires, firewood gathering, and equestrian activities would remain unchanged from the 1988 RMP. Thus, impacts to upland vegetation from campfires, firewood gathering, and equestrian activities would be a continuation of the trends under existing conditions. The types of direct and indirect impacts that would be expected from campfires, firewood gathering, and equestrian activities are described at the beginning of this section.

Alkali Lake would be managed as an OHV area (944 acres). Special oil and gas stipulations would remain in place, which would continue to protect OHV trails and camping areas from all development authorizations in the area. Alkali Lake would continue to require special recreation permits for competitive or commercial motorcycle events and management under full fire suppression would also continue.

OHV use would increase the potential for impacts to upland vegetation, such as crushing, compaction and the spread of noxious weeds and invasive plants. It would also be managed with 944 acres open for ROW development. The fewer the acres managed for ROWs, the less potential for impacts to upland vegetation from ROW-related surface disturbance.

Approximately 53,573 acres of the Hackberry Lake SRMA would be managed as limited to existing travel and 53,573 acres of the SRMA would be managed as OHV limited. The fewer the acres open to travel and the more restrictions on trial use, the less potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Pecos River Corridor would be managed as an SRMA and surface disturbance would be restricted throughout the SRMA to reduce erosion and minimize impacts to upland habitat. Reducing surface disturbance would reduce the potential for the impacts to upland vegetation. Approximately 122 acres around the Red Bluff Reservoir would be closed to OHV use, and the remaining 4,809 acres would be managed as OHV limited. Restricting OHV use would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

West Wells Dune (624 acres) would not be managed as an ERMA but would be managed with entire acreage open for ROW development. The fewer the acres managed for ROWs, the less potential for impacts to upland vegetation caused by ROW-related surface disturbance.

Dispersed use would be allowed in the Pecos River ERMA (11,207 acres), but no developed trails would be allowed. Likewise, dispersed use would be allowed in the Hay Hollow area (12,913 acres), but no trails would be developed. The fewer the number of trails present, the less potential for adverse impacts to upland vegetation, such as crushing, compaction, and the spread of noxious weeds and invasive plants.

Impacts from Alternative A

Under Alternative A, approximately 2,039,299 acres would be OHV limited and 52,028 acres would be closed (see Table 4-25). The magnitude of adverse impacts would be similar to the No Action Alternative. The types of direct and indirect impacts that would be expected in areas of OHV use are described at the beginning of this section.

Restrictions on campfires and firewood gathering would be applied in riparian areas. Thus, upland vegetation and noxious weeds management would continue to experience direct and indirect adverse impacts from these activities. Equestrian activities would not be permitted in riparian areas on the Pecos, Delaware, and Black Rivers, as well as on perennial springs and seeps. Thus, upland vegetation would continue to experience direct and indirect adverse impacts from equestrian activities. The types of direct and indirect impacts that would be expected from campfires, firewood gathering, and equestrian activities are described under Impacts from Management Common to All above.

Alkali Lake (318 acres) would be managed as an SRMA and would be a ROW exclusion area on dunes and a ROW avoidance area elsewhere. The fewer the acres managed for ROW, the less potential for the spread of noxious weeds and impacts to upland vegetation from ROW-related surface disturbance. Special oil and gas stipulations would be applied to protect approved OHV trails and camping areas to all development authorizations within the area. The fewer the acres managed for mineral exploration and development, the less potential for spread of noxious weeds and impacts to upland vegetation from surface disturbance caused by these activities.

The Pecos River Corridor SRMA (9,136 acres) would be managed to provide recreation opportunities on public land parcels with an emphasis on natural and scenic qualities. Travel in the SRMA would be limited to existing routes, which would help limit impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. The SRMA would be managed as open with major constraints for fluid leasables and closed to locatable and salable development. The more restrictions on mineral exploration and development, the less potential for adverse impacts to upland vegetation from surface disturbance caused by these activities. The SRMA would be prioritized for brush control and weed treatments, which would help protect upland vegetation from the spread of noxious weeds and invasive plants.

Under Alternative A, West Well Dunes management would be the same as under the No Action Alternative in relation to mineral development and ROW construction. Travel in the area would be limited to existing trails/dunes, which would help limit the impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Square Lake (2,975 acres) would be managed as an ERMA and would provide for limited OHV play experiences on open dunes while restricting travel to designated routes between dunes. The ERMA would be closed to camping during the LPC breeding season (March 1–June 15, 3:00–9:00 a.m.). Restricting camping activities would reduce the potential for impacts to upland vegetation where applicable during this period, such as crushing and the spread of noxious weeds and invasive plants. OHVs would be limited to designated routes between dunes, which would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Approximately 2,973 acres would be open with moderate constraints to leasable and salable mineral development. Approximately 2,973 acres would be open for locatable mineral development under this alternative. The more acres managed for mineral exploration and development, the greater potential for impacts to upland vegetation from surface disturbance caused by these activities.

The Pecos River Equestrian Trail and Hay Hollow Equestrian ERMAs would be managed the same as is described under the No Action Alternative.

Impacts from Alternative B

Under Alternative B, approximately 2,049,391 acres would be OHV limited and 41,936 acres would be closed (see Table 4-25). Thus, Alternative B would have similar impacts to upland vegetation from OHV use compared to the No Action Alternative. The types of direct and indirect impacts that would be expected in areas of OHV use are at the beginning of this section.

Restrictions on campfires and firewood gathering would be applied in certain riparian areas. Thus, upland vegetation would continue to experience direct and indirect adverse impacts from these activities. Equestrian activities would be restricted to existing trails in riparian areas on the Pecos and Delaware Rivers, as well as perennial springs and seeps. The Black River would be closed to equestrian activities. Thus, upland vegetation would continue to experience direct and indirect adverse impacts from

equestrian activities. The types of direct and indirect impacts that would be expected from campfires, firewood gathering, and equestrian activities are described under Impacts from Management Common to All above.

Alkali Lake would be managed as SRMA, with the same prescriptions as Alternative A.

Square Lake (2,975 acres) and West Well Dunes (624 acres) would be managed as ERMAs. Travel in the ERMA would be limited to designated trails/dunes and trails would be expanded on case-by-case basis. Restrictions on travel would reduce the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Entire acreage of West Well Dunes would be closed to leasable and salable mineral development, and 624 acres would be withdrawn to locatable mineral development. It would be closed entirely to ROW development. The fewer the acres managed for ROW and mineral development, the less potential for impacts to upland vegetation from surface disturbance caused by these activities.

The Pecos River Equestrian Trail would be managed as an ERMA. Certified weed-free hay would be required in the ERMA, which would reduce the potential for impacts to upland vegetation from the spread of noxious weeds and invasive plants. The ERMA would be a ROW avoidance area. The fewer the acres managed for ROWs, the less potential for impacts to upland vegetation from ROW-related surface disturbance. New trails would be designated/constructed in combination with existing trails, excluding the Delaware River portion of the ERMA. An increased number of trails would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. No motorized or mechanized use would be allowed on single-track portions of the equestrian trail. The more restrictions on motorized and mechanized travel, the less potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Hay Hollow equestrian trail (12,913 acres) would be managed as an ERMA, with potential trail and facility development. The use of certified weed-free hay would be required in the ERMA, which would reduce the potential for impacts to upland vegetation from the spread of noxious weeds and invasive plants. The ERMA would be open to grazing, which would increase the potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Approximately 5,617 acres would be open with standard terms to leasable, salable and locatable mineral development. The fewer the acres managed for mineral exploration and development, the less potential for impacts to upland vegetation from surface disturbance caused by these activities. COAs for ROWs would also be applied to the ERMA, though entire acreage would be open to ROW development. The more restrictions on ROWs in place, the less potential for impacts to upland vegetation from ROW-related surface disturbance.

Impacts from Alternative C

Under Alternative C, approximately 2,052,582 acres would be OHV limited and 38,738 acres would be closed. This is the least amount of acreage that would be closed under all the alternatives except for Alternative D, which proposes to close 38,737 acres to OHV use (see Table 4-25). Thus, Alternative C would have more impacts to upland vegetation from OHV use than the No Action Alternative. The types of direct and indirect impacts that would be expected in areas of OHV use are described at the beginning of this section.

Impacts to upland vegetation from campfires and firewood gathering would be the same as those under Alternative B, because the management actions would be the same.

Any ROWs proposed in the EMRA would have to adhere to COAs for ROWs (see Appendix O). The fewer the acres managed for ROWs, the less potential for impacts to upland vegetation from ROW-related surface disturbance.

West Well Dunes and the Pecos River Equestrian Trail would be managed as ERMAs with the same prescriptions described under Alternative B.

The Hay Hollow Equestrian ERMA would be managed the same as is described under the No Action Alternative.

Square Lake (5,285 acres) would be managed as an ERMA with the same prescriptions as described under Alternative A.

Impacts from Alternative D

Under Alternative D, approximately 2,052,584 acres would be managed as OHV limited and 38,737 acres as closed, which is the least amount of acreage closed under all the alternatives (see Table 4-25). Thus, Alternative D would have more impacts to upland vegetation from OHV use than the No Action Alternative. The types of direct and indirect impacts that would be expected in areas of OHV use are described at the beginning of this section.

Impacts to upland vegetation from campfires, firewood gathering, and equestrian activities would be the same as those described under Alternative B, because the management actions would be the same.

Pecos River Equestrian Trail ERMA would designate/construct new trail in combination with using existing trails, with no motorized or mechanized use allowed on single-track portions of the equestrian trail. The more restrictions on motorized and mechanized travel near riparian areas, the less potential for impacts to upland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

West Well Dunes (624 acres) would be managed as an ERMA with the same prescriptions described under Alternative B.

Impacts of Special Designations on Upland Vegetation/Noxious Weeds Management

Special designations would provide beneficial impacts to upland vegetation resources and noxious weed management if they impart restrictions on surface-disturbing activities within their boundaries. Restrictions on surface-disturbing activities associated with various land use activities, such as mineral development, livestock grazing, and OHV use, would minimize the potential spread of noxious weeds and other adverse impacts to vegetation resources located within these special designation areas.

Impacts of Areas of Critical Environmental Concern Management Actions on Upland Vegetation/Noxious Weeds Management

ACECs are managed to protect relevant and important values and would benefit upland vegetation communities when there are surface disturbance restrictions in place, for example restrictions on mineral development, livestock grazing and/or OHV use. These surface-disturbing activities would impact upland vegetation by potentially affecting the relative abundance and relative distribution of species within plant communities and reducing the overall vegetative cover. Indirect adverse impacts from surface disturbance on vegetation would include soil compaction, erosion, sedimentation, and an increased likelihood of noxious weed invasion.

Impact analysis from ACEC management actions on upland vegetation was based on the number of acres within ACECs that are proposed for closure to livestock grazing, mineral development, and OHV use. Table 4-26 below presents the number of acres closed to all three of these land use activities, bearing the assumption that the greater number of acres closed would equate to a reduction in potential adverse impacts to upland vegetation and spread of noxious weeds.

Table 4-26. Number of Acres Closed to Livestock Grazing, Mineral Development, and OHV Use Activities within ACECs where Designated

Land Use	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres designated as ACECs	13,435	495,042	561,433	98,562	28,894
Total acres closed to grazing	0	449,747	135,480	5,735	201
Acres closed to OHV use	5,052	6,208	6,647	5,589	4,254
Acres of NSO and closed to leasable mineral development	11,997	422,462	494,794	44,683	28,894
Acres closed to salable mineral development	12,613	197,644	298,343	44,824	26,468
Acres recommended for withdrawal from locatable mineral development	13,434	96,781	154,915	43,878	26,470

Impacts from Management Common to All

There are no proposed management actions for ACECs listed under impacts from management common to all alternatives.

Impacts from Management Common to All Action Alternatives

There are no proposed management actions for ACECs listed under impacts from management common to all action alternatives.

Impacts from the No Action Alternative

Under the No Action Alternative, current ACEC designations would continue as outlined in the 1988 RMP. Six existing ACECs, totaling 13,435 acres (see Table 4-26), would continue to be managed under this alternative with no additional ACECs designated. Under this alternative, approximately 89% of the total ACEC acreage would remain designated as NSO/closed to leasable mineral exploration and development, although the majority of acreage would remain open to salable and locatable mineral development (see Table 4-26). Under the No Action Alternative, 5,052 acres would remain closed to OHV use, and 7,556 acres would be limited, while grazing would remain open on all of the 13,435 acres currently managed as ACECs within the planning area.

Adverse impacts, such as soil compaction and degradation, as well as direct vegetation removal potential increase in noxious weeds would continue within these ACEC acreages.

Impacts from Alternative A

Under Alternative A, approximately 495,042 acres would be designated under ACECs (see Table 4-26). This would mark a substantial increase in ACEC-designated acres compared to the approximately 13,516 acres designated under the No Action Alternative. Livestock grazing would be prohibited in the Carlsbad Chihuahuan Desert Rivers and Pecos Bluntnose Shiner ACECs, and reduced within the Gypsum Soils ACEC. All in all, 449,747 ACEC acres (90%) would be closed to grazing.

Under this alternative, 422,464 (85%) acres of total ACEC acreages would be designated as NSO/closed to leasable mineral development and 96,781 acres (19%) withdrawn from locatable mineral development. Additionally, 1% of total ACEC acreage would be closed to OHV use.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-26.

Impacts from Alternative B

Under Alternative B, 561,433 acres would be designated under ACECs, representing a significantly sizable increase in the number of acres designated compared to the No Action Alternative. Of this ACEC acreage, 494,794 (88%) acres would be designated as NSO/closed to leasable minerals development and 154,915 acres (27%) would be recommended for withdrawal from locatable mineral development (see Table 4-26). Additionally, livestock grazing would be prohibited on 135,480 ACEC acres (27%) and 540,220 acres would be OHV limited and 6,647 acres (1.0%) would be closed to OHV use. Adverse impacts, such as soil compaction and degradation, as well as vegetation removal and increase in noxious weeds would be minimized within these ACECs.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-26.

Impacts from Alternative C

Under Alternative C, approximately 98,563 acres would be designated under ACECs. This would represent a substantial increase in the number of acres designated compared to the No Action Alternative. Under this alternative, 44,683 acres of ACEC acreages would be designated as NSO/closed to leasable minerals development (45%) and 43,878 acres recommended for withdrawal (44%) from locatable minerals development; 5,735 acres closed to livestock grazing (6%), and 88,052 acres (89%) would be OHV limited and 5,589 acres (6%) would be closed to OHV use (see Table 4-26). Adverse impacts, as those described above, would be minimized within these ACECs.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-26.

Impacts from Alternative D

Under Alternative D, five ACECs representing 28,894 acres would be designated, representing a moderate increase in the number of ACEC acres compared to the No Action Alternative. Under this alternative, 28,894 ACEC acreages would be designated as NSO/closed to leasable mineral development and 26,470 acres (91%) would be recommended for withdrawal from locatable mineral development, 201 acres (0.7%) would be closed to livestock grazing, and 22,970 acres (79%) would limit travel to existing routes and 4,254 acres (15%) would be closed to OHV use.

Qualitatively, adverse impacts associated with surface-disturbing activities would be the same as those described under the No Action Alternative; however, the magnitude of the impacts would be smaller under this alternative due to the larger number of ACEC designated acres closed to the major surface-disturbing activities depicted in Table 4-26.

Impacts of Wilderness Study Areas on Upland Vegetation/Noxious Weeds Management

Impacts from Management Common to All

All vegetation resources within the four designated WSAs would benefit from additional protection through special management requirements, including a closed designation for all future leases and no reissuing of current leases once expired, which would enhance and preserve its wilderness values, including plant communities within the unit. In addition, new permanent facilities and new surface disturbance would be prohibited, all of which would reduce adverse impacts to vegetation and noxious weed management within the units, including increased soil erosion and compaction, a reduction in plant cover, health and vigor, decreased native plant diversity, a potential increase in noxious weeds, decreased habitat fragmentation, and loss of pollinators and pollinator habitat.

Impacts from Management Common to All Action Alternatives

There are no proposed decisions listed under management common to all action alternatives.

Impacts from the No Action Alternative and Alternatives A through D

Under the No Action Alternative, the four WSAs would remain under their current designation and managed accordingly under prescriptions outlined in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c), such as closed to all future leasing or NSO designations, closed to salables, withdrawn from locatables, OHV limited, closed or excluded from renewable energy, and designated as VRM Class I and as a ROW avoidance area. These management prescriptions would continue to minimize adverse impacts to upland vegetation resources and noxious weeds management through restrictions on surface-disturbing activities.

Impacts of Wilderness Study Area Management if WSAs Are Released from Designation on Upland Vegetation/Noxious Weeds

Impacts from Management Common to All

Impacts would be the same as those stated in Impacts of Management Common to All in the Impacts of Wilderness Study Areas on Upland Vegetation/Noxious Weeds Management section.

Impacts from the No Action Alternative

Impacts would be the same as those stated in the Impacts from the No Action Alternative in the Impacts of Wilderness Study Areas on Upland Vegetation/Noxious Weeds Management section.

Alternatives A, B, and C

If the WSA designation is removed, the four previously designated WSAs would be managed as closed to leasable and salable development and recommended for withdrawal from locatable development. Adverse impacts under these three alternatives would be comparable to those under the No Action Alternative and as described under management common to all.

Alternative D

Under Alternative D, adverse impacts resulting from loss of WSA designation would be greater than those found under the other alternatives because management prescriptions would be less stringent for surface-disturbing activities. Unlike the other four alternatives, leasable mineral development would be open with major constraints, salable mineral development would be open with special terms and conditions and the areas would be open for locatable development. In addition, the proposed VRM class on these lands would be Class III.

Adverse impacts, as those described under management common to all alternatives, would be greater under Alternative D compared to the No Action Alternative and also compared to Alternatives A through C.

Impacts of Wild and Scenic Rivers on Upland Vegetation/Noxious Weeds Management

Impacts from Management Common to All

There are no proposed management decisions common to all alternatives that would significantly impact vegetation because management prescriptions here address decisions made in Congress pertaining to WSR designations.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, the Black River would be recommended as suitable for inclusion in the NWSRS and would be given the same management prescriptions as other WSR areas, including a VRM Class I classification. Beneficial impacts vegetation would result, as the WSR designation would limit surface-disturbing activities that would potentially result in adverse impacts to these vegetation, such as alterations in plant community composition, direct removal of native plant species, increased erosion, compaction, and likelihood for noxious weed invasion.

Impacts from the No Action Alternative

Under the No Action Alternative, the Black River would continue to not be managed as part of the NWSRS but would be managed to maintain eligibility as a WSR until a suitability determination is made during the RMP process. The Black River would be managed with the following management prescriptions: designation as VRM Class III, closed to salable development, recommended for withdrawal from locatable mineral development, and with leasables open with major constraints. All ROW construction would continue to be designated under "avoidance" within WSR areas and all renewable energy development would not be allowed. The Delaware River would also not be managed as part of the WSR but would be managed to maintain its eligibility until a suitability determination is made during the RMP process. The Delaware River would be managed with various prescriptions, such as classifying certain segments of the river under VRM Class II and IV, closing or excluding areas adjacent to the river to renewables development, managing as NSO for leasable mineral development and closed to salable development, recommending for withdrawal from locatable development, and managing as ROW avoidance area.

Impacts from Alternatives A, B, and C

Under these three alternatives, WSR areas would be managed with the following prescriptions: VRM Class II, travel limited to designated routes, closed to leasable and salable mineral development, recommended for withdrawal from locatable mineral development, and excluded from both ROW development and renewable energy projects. All of these prescriptions would minimize surface disturbance and, therefore, reduce adverse impacts to upland vegetation resources and noxious weeds management. The potential for adverse impacts to upland vegetation and noxious weeds management would be expected to be reduced under this alternative compared to the No Action Alternative due to ROW exclusions and managing the entire area as VRM Class II.

Impacts from Alternative D

Under Alternative D, management prescriptions would be the same as those under Alternatives A, B, and C with the exception of the allowance of leasable development open with major constraints on WSR lands. The potential for adverse impacts to upland vegetation and noxious weeds management would be expected to be reduced under this alternative compared to the No Action Alternative due to ROW exclusions and managing as VRM Class II.

Impacts of Lands with Wilderness Characteristics Actions on Upland Vegetation/ Noxious Weeds Management

Those upland vegetation resources located within lands with wilderness characteristics being managed to protect wilderness characteristics would receive beneficial impacts as a result of additional management prescriptions aimed at further minimizing surface disturbances. The greater the number of acres managed to protect lands with wilderness characteristics, the greater the benefit to upland vegetation.

When units are managed to emphasize multiple uses while applying some protective management (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics, there would be some long-term benefits to vegetative communities, but it would depend on the prescriptions for the individual units. See Section 4.2.9 Lands with Wilderness Characteristics for details. Where lands with wilderness characteristics units are managed to emphasize other multiple uses as a priority over protecting wilderness characteristics, ground-disturbing activities such as minerals development may still be allowed and would offer less protection to vegetation communities.

The amount of acreages that would be managed to protect wilderness characteristics varies by alternative and are represented in Table 4-27.

Table 4-27. Number of Acres of Lands with Wilderness Characteristics and Level of Management under Each Alternative

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	*N/A	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	*N/A	0	18,964	30,595	0
Emphasizes other multiple uses	*N/A	0	0	30,862	65,446

*There would be no units managed lands with wilderness characteristics under the No Action Alternative.

Impacts from Management Common to All

There are no decisions listed under management common to all.

Impacts from Management Common to All Action Alternatives

Upland vegetation resources occurring on lands with wilderness characteristics would receive indirect positive impacts as a result of applicable management prescriptions, including closure to leasing or NSO stipulations; restrictions on the construction of new roads, structures, and facilities not related to the preservation and enhancement of wilderness characteristics; and vehicular use limited to designated routes only. As a result of these management prescriptions, beneficial impacts to upland vegetation resources would include a reduction in erosion and compaction and a reduction in amount of native vegetation cover lost to surface disturbance. Additionally, the likelihood of noxious weed invasion as a result of surface disturbance would be minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, upland vegetation resources and noxious weed management would not receive any beneficial impacts because no acreage would be managed as lands with wilderness characteristics, and therefore no upland vegetation resources would benefit from management prescriptions, as described above, specific to lands with wilderness characteristics.

Impacts from Alternative A

Under Alternative A, the BLM would manage 66,666 acres to protect lands with wilderness characteristics. Associated management prescriptions would benefit upland vegetation by closing all lands with wilderness characteristics s to future leases, withdrawing all acres from locatables and salables, excluding ROWs, and limiting travel to existing routes. Chemical vegetation treatments would be allowed and would impart beneficial impacts to upland vegetation by eliminating competition with invasive, noxious species within lands with wilderness characteristics and would move the plant communities toward ecological objectives and desired long-term conditions. Other beneficial impacts resulting from these management prescriptions would include decreased erosion, sedimentation, and potential for noxious weed invasion.

Compared to the No Action Alternative, which manages no lands with wilderness characteristics and does not propose any new management prescriptions (including those that would address noxious weeds control), the magnitude of beneficial impacts to upland vegetation and noxious weed management is much greater under Alternative A.

Impacts from Alternative B

Under Alternative B, the BLM would designate 47,611 to protect lands with wilderness characteristics, approximately 18,964 acres to emphasize other multiple uses while applying some protective management and zero acres to emphasize other multiple uses.

Compared to the No Action Alternative, which manages no lands with wilderness characteristics and does not propose any new management prescriptions (including those that would address noxious weeds control), the magnitude of beneficial impacts to upland vegetation is much greater under Alternative B.

Impacts from Alternative C

Under Alternative C, the BLM would manage to protect wilderness characteristics on 5,119 acres, approximately 30,595 acres to emphasize other multiple uses while applying some protective management, and 30,682 acres to emphasize other multiple uses.

Compared to the No Action Alternative, which manages no lands with wilderness characteristics and does not propose any new management prescriptions (including those that would address noxious weeds control), the magnitude of beneficial impacts to upland vegetation is much greater under Alternative C.

Impacts from Alternative D

Under Alternative D, the BLM would manage to protect wilderness characteristics on 1,221 acres, approximately zero acres to emphasize other multiple uses while applying some protective management, and 65,446 acres to emphasize other multiple uses.

Compared to the No Action Alternative, which manages no lands with wilderness characteristics and does not propose any new management prescriptions (including those that would address noxious weeds control), the magnitude of beneficial impacts to upland vegetation is slightly greater under Alternative D.

Impacts of Fish and Wildlife Actions on Upland Vegetation Resources/Noxious Weeds Management

Fish and wildlife management actions would indirectly benefit upland vegetation resources and weed management if species management stipulations prohibited surface-disturbing activities. NSO stipulations to protect wildlife habitat from surface-disturbing activities, route closures to reduce road density and habitat fragmentation, and travel restrictions on motorized and mechanized travel would all benefit vegetation by reducing adverse impacts, such as loss of vegetation cover, reduced plant species abundance and diversity, soil erosion and compaction, and an increase in noxious weed invasion.

Impacts from Management Common to All

Upland vegetation resources and noxious weeds management would potentially benefit from habitat improvement projects (identified through HMPs), which would be implemented where necessary to stabilize and improve declining habitat conditions.

Stipulations contained in Appendix C provide for a 1,312-foot surface disturbance buffer around all caves with active bat roosts. This would contribute to a greater protection upland vegetation resources around these caves. In addition, plant communities that fall within Phantom Banks Heronries and other areas managed specifically for habitat improvement projects would benefit from minimized surface disturbance and subsequent impacts. Upland vegetation resources may also receive some benefits from a 1,312-foot buffer prohibiting surface-disturbing activity if located near trees with active raptors nests.

Impacts from Management Common to All Action Alternatives

Under all of the action alternatives, the BLM would implement various wildlife management prescriptions that would indirectly benefit vegetation and noxious weeds management. These would include the promotion of wildlife movement corridors, which would minimize surface disturbances, the creation of HMPs to ensure the enhancement of several vegetation communities and habitat types across the planning area, and seasonal restrictions on all surface-disturbing activities within approximately 252 acres or a 0.25-mile radius around active heronries. These prescriptions would help minimize adverse impacts associated with surface disturbance, such as a decrease in ground cover and a reduction in plant diversity and abundance, reduced habitat fragmentation, and increased likelihood of noxious weeds invasion.

Impacts of Minerals Actions on Upland Vegetation/Noxious Weeds Management

Minerals management actions include the fluid leasable minerals oil and gas; the solid leasable mineral potash; locatable minerals gypsum, copper, gold, uranium, etc.; and salable minerals sand, gravel, rock, etc. Minerals actions would cause soil surface disturbances that would directly and indirectly adversely

affect upland vegetation. Surface disturbance associated with minerals actions would directly remove surface vegetation, thereby substantially altering the plant community composition, increasing potential for erosion and soil compaction and increasing the likelihood for the invasion of noxious weeds. Reclamation of disturbed sites would be required, although a return to pre-disturbance conditions may take years to achieve (Monsen et al. 2004). While the RFD assumes that reclamation of disturbance would be successful within a scope of 10 years, it does note that reclamation times would be dependent on soils, vegetation, and rainfall (BLM 2005). Revegetation is especially difficult in desert shrub habitats, because soils are shallow and highly saline, and moisture availability is relatively low (Monsen et al. 2004). As a result, many of the adverse impacts resulting from surface disturbances associated with well pads, access roads, and minerals infrastructure would be long term and, in some cases, irrevocable.

Table 4-28. Planned Acreages Closed, Open with Major or Moderate Constraints and Recommended for Withdrawal across Leasable, Salable and Locatable Mineral Exploration Management Actions across Alternatives for BLM Surface Lands

Leasables Management Decisions	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Open with moderate constraints	956,410	799,649	449,759	786,381	631,634
Open with major constraints (NSO)	54,602	80,394	162,013	158,401	70,142
Closed	174,391	761,404	1,082,972	88,502	84,687
Total	***2,784,273***	***2,784,248***	***2,784,224***	***2,784,058***	***2,784,145***
Salables Management Decisions					
Open	2,637,465	1,160,064	1,121,118	1,784,431	2,028,324
Open with special terms and conditions	–	1,062,192	726,270	752,286	602,621
Closed	146,568	561,995	936,799	247,323	153,174
Total	***2,784,033***	***2,784,251***	***2,784,186***	***2,784,041***	***2,784,119***
Locatables Management Decision					
Open to mineral entry	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
Recommended (or previously recommended) for withdrawal	32,374	380,990	673,996	132,249	122,444
Total	***2,784,229***	***2,784,105***	***2,784,094***	***2,784,104***	***2,784,149***

Table 4-29. Predicted Number of Wells and Surface Disturbance from Planned Leasable Mineral Activities (oil and gas wells)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Number of predicted wells on **BLM-administered surface lands only** (based on % of land open to surface disturbance)	5,874	4,465	3,538	5,832	6,044
Total predicted surface disturbance/acres on **BLM-administered surface lands only**	11,515	8,753	6,936	11,434	11,849

Impacts from Management Common to All

The BLM would encourage and facilitate the development of public land mineral resources so that national and local needs are met, and environmentally sound exploration, extraction, and reclamation practices are used. The BLM would also monitor salable and leasable mineral operations to ensure proper resource recovery. Monitoring and enforcement of lease, sale, or permit terms would help reduce adverse impacts, as those described above, to upland vegetation.

The planning area would be available for location of mining claims unless withdrawn.

Closure and rehabilitation of existing salable minerals pits would be completed on a case-by-case basis. Closure and proper rehabilitation of pits would reduce the potential for impacts to upland vegetation by reducing surface-disturbing activities. Restrictions on new salable mineral material sites in LPC habitat in the Core Management Area (CMA), Primary Population Area (PPA), and Sparse and Scattered Population Areas (SSPA), as well as restrictions on new salable mineral material sites near active lek sites in the Isolated Population Area (IPA) would reduce the potential for impacts to upland vegetation in applicable areas by reducing surface-disturbing activities.

New caliche pits would be permitted only when existing pit locations are not close enough (usually within 3 miles) to support multiple-use needs. Reduced surface disturbance would reduce the potential for impacts to upland vegetation.

The majority of the planning area would be open to salable mineral development subject to site-specific NEPA analysis, stipulations, and 43 CFR 3600 regulations. NEPA analysis and applicable stipulations and regulations may also help reduce the potential for impacts to riparian vegetation.

Upon receipt of a Notice of Intent (NOI), special mitigative measures or restrictions would be applied as necessary. The surface use and occupancy requirements and OHV use designations would also be applied to geophysical exploration, when necessary. Applicable mitigation measures, restrictions, requirements, and designations would reduce the potential for impacts to upland vegetation from surface disturbance caused by minerals development and OHV use.

The BLM would encourage the use of practices that reduce the extent of surface disturbance and to mitigate other forms of impacts. Reduced surface disturbance would lower the potential for adverse impacts to upland vegetation. Revegetation of disturbed areas would be required. Proper revegetation in upland areas would benefit upland vegetation. Reclamation techniques may be used to enhance the reclamation of pits, roads, and well pads to provide for maximum ground and surface water protection. Proper reclamation in upland areas would benefit upland vegetation.

The BLM would continue to apply reasonable mitigation measures, such as relocating proposed operations by no more than 656 feet or prohibiting new surface disturbance for a period of no more than 60 days. Applicable mitigation measures would reduce the potential for adverse impacts to upland vegetation.

A Controlled Surface Use (CSU) restriction would be applied when needed as a COA for APDs for oil or gas wells proposed in the City of Carlsbad's municipal water well field, or within 3 miles of the field. This CSU restriction would apply to an area of about 26,800 acres of public surface and minerals, and about 2,720 acres of federal mineral estate under other surface ownerships. Restrictions on surface disturbance would help reduce the potential for adverse impacts to upland vegetation.

Management actions common to all that would not affect upland vegetation include actions that focus on other resources, such as wildlife (e.g., wildlife deterrents around open pits), required plastic pipe specification, and protection of caves and karsts.

Impacts from Management Common to All Action Alternatives

After it has been determined that a locatable mineral discovery has been made on a claim or set of claims, an interdisciplinary team would determine whether locatable mineral plans of operation cause unnecessary and undue degradation to resources on a case-by-case basis and identify stipulations or mitigation measures as appropriate. Applicable stipulations or mitigation measures would reduce the potential for adverse impacts to upland vegetation.

The BLM may require a third-party compliance monitor for oil and gas construction activities to monitor environmental concerns. A third-party compliance monitor could help reduce the potential for adverse impacts to upland vegetation.

Salable minerals pits that have been or are being reclaimed would not be re-opened for materials disposal without the authorization of the field office manager. Reduced surface disturbance would help reduce the potential for adverse impacts to upland vegetation.

Management actions common to all action alternatives that would not affect upland vegetation include actions that focus on other resources, such as water resources (e.g., restrictions on chemicals used in hydraulic fracturing pond water, casing requirements, groundwater monitoring, tailings impoundment requirements), requirements for pipeline burial, and closing access to abandoned tailings piles.

Impacts from the No Action Alternative

Under the No Action Alternative, minerals actions impacts to upland vegetation would result from the continuation of current minerals management. This alternative does not propose management prescriptions or stipulations on many aspects of mineral development, such as restrictions on locations of earthen hydraulic fracturing ponds and hydraulic fracturing water containment and testing, requirements for tank battery liners and secondary containment areas, requirements for a Plan of Development (POD) to contain an erosion control plan, or a completion deadline for all interim reclamation projects. It has no restrictions in place concerning geophysical activities.

In highly sensitive areas, this alternative does adhere to special stipulations aimed at mitigating adverse impacts to other resources, including soil and water. Stipulations include the designation of 46,481 acres as NSO, and the leasing of oil and gas in accordance with CFR 43 3100 and the EA for Oil and Gas Leasing in the Roswell District (BLM 2014b).

Under the No Action Alternative, approximately 228,993 acres would be closed or open with major constraints (NSO) to leasable mineral exploration across the planning area (see Table 4-28). Approximately 146,568 acres would be closed to salables and 32,374 acres would be recommended for withdrawal from locatables (see Table 4-28). The planned leasable mineral activities (oil and gas wells) under the No Action Alternative predict approximately 11,515 acres of surface disturbance and 5,874 new wells on BLM-administered surface lands (see Table 4-29). Adverse impacts to upland vegetation, as those described above, would continue within areas with surface-disturbing activities associated with mineral development and exploration.

Impacts from Alternative A

Under Alternative A, the BLM would manage lands for mineral development with specific stipulations that are not required or addressed under the No Action Alternative. These would include prohibiting surface disturbance within 0.5 mile from human occupied permanent structures and sensitive receptors for existing leases, prohibiting earthen hydraulic fracturing ponds within specific sensitive areas such as within gypsum and limestone soils, soils that are greater than 10%, and within floodplains and drainages. Disposal of produced water in lined pits would also be prohibited under this alternative. Other stipulations under Alternative A would include management aimed at preventing contamination of soil and water resources, which would indirectly benefit upland vegetation. Some of these stipulations are prohibiting earthen pits for recycling or flowback water, requirements for tank battery liners in secondary containment areas, and also for spill prevention and leak detection methods for both new and existing facilities. Collocation of multiple wells on a single pad, in order to reduce surface disturbance, would be required within critical karst resource zones and high karst potential occurrence zones, as well as on gypsum sensitive soils, all of which would minimize the potential for subsequent adverse impacts to upland vegetation.

Under Alternative A, approximately 228,993 acres would be closed or open with major constraints (NSO) to leasable mineral exploration across the planning area (see Table 4-28). Approximately 1,062,192 acres would be open with special terms and conditions for salables and 380,990 acres would be recommended for withdrawal from locatables (see Table 4-28). The planned leasable mineral activities (oil and gas wells) under this alternative predicts approximately 8,753 acres of surface disturbance with 6,565 acres of surface disturbance remaining after reclamation (see Table 4-29), representing a 24% decrease compared to the No Action Alternative.

Compared to the No Action Alternative, which does not require the same degree of mitigation measures as found under Alternative A and also includes a 24% increase in the number of predicted wells (see Table 4-29), the magnitude of adverse impacts to upland vegetation and noxious weeds management would be smaller under Alternative A.

Impacts from Alternative B

Under Alternative B, management prescriptions, stipulations, and mitigation measures would be identical to those under Alternative A with the exception of allowing earthen hydraulic fracturing ponds in gypsum soils (prohibited under Alternative A).

Under Alternative B, approximately 1,244,984 acres would be closed or open with major constraints (NSO) to leasable mineral exploration across the planning area (see Table 4-28). Approximately 726,270 acres would be open with special terms and conditions for salables and 326,623 acres would be recommended for withdrawal from locatables (see Table 4-28). The planned leasable mineral activities (oil and gas wells) under this alternative predicts approximately 3,538 wells with 5,202 acres of surface disturbance remaining after reclamation (see Table 4-29), representing a 40% decrease compared to the No Action Alternative.

Also, compared to the No Action Alternative, which does not require the same degree of mitigation measures as found under Alternative A and also includes a 40% increase in the number of predicted wells (see Table 4-29), the magnitude of adverse impacts to upland vegetation and noxious weeds management would be smaller under Alternative B.

Impacts from Alternative C

Under Alternative C, management prescriptions would include the requirement for wireless seismic to be considered on a case-by-case basis in areas deemed sensitive to the use of conventional seismic. Earthen hydraulic fracturing ponds, although prohibited on slopes greater than 10%, would be allowed on sensitive soils such as gypsum and within floodplains and drainages. Earthen pits for recycling produced or flowback water would be allowed on a case-by-case basis, though they are required to be netted. Other mitigation measures would be similar to those found under Alternatives A and B.

Under Alternative C, approximately 246,903 acres would be closed or open with major constraints (NSO) to leasable mineral exploration across the planning area (see Table 4-28). Approximately 999,610 acres would be closed or open with special terms and conditions for salables and 132,249 acres would be recommended for withdrawal from locatables (see Table 4-28). The planned leasable mineral activities (oil and gas wells) under this alternative predicts approximately 5,832 wells and 8,575 acres of surface disturbance remaining after reclamation (see Table 4-29), representing a 1% decrease compared to the No Action Alternative.

Also, compared to the No Action Alternative, which does not require the same degree of mitigation measures as found under Alternative C and also includes a 1% decrease in the number of predicted wells (see Table 4-29), the magnitude of adverse impacts to upland vegetation and noxious weeds management would be slightly smaller under Alternative C.

Impacts from Alternative D

Under Alternative D, management prescriptions and stipulations would include hydraulic fracturing ponds and would be allowed on a case-by-case basis, disposal of produced water would be allowed, as is the case under the No Action Alternative, however; they would be prohibited in critical karst resource zones and high karst potential occurrence zones. Leak detection systems would not be required under this alternative. Other stipulations would be identical to those found under Alternatives A and B.

Under Alternative D, approximately 154,829 acres would be closed or open with major constraints (NSO) to leasable mineral exploration across the planning area (see Table 4-28). Approximately 755,794 acres would be closed or open with special terms and conditions for salables and 122,444 acres would be recommended for withdrawal from locatables (see Table 4-28). The planned leasable mineral activities (oil and gas wells) under this alternative predicts approximately 6,044 wells and 8,887 acres of surface disturbance after reclamation representing a 3% increase compared to the No Action Alternative (see Table 4-29).

Though management actions under Alternative D do propose additional mitigation measures and stipulations than under the No Action Alternative, the acres of surface disturbance are 3% greater under this alternative. Predicted number of wells is also slightly greater under this alternative compared to the No Action Alternative (see Table 4-29); therefore, the magnitude of adverse impacts to upland vegetation and noxious weeds management would be greater under Alternative D compared to the No Action Alternative.

Impacts of Visual Resources Management Actions on Upland Vegetation/Noxious Weeds Management

VRM class designations have specific management objectives that, depending on the class designated, could beneficially impact vegetation resources. The objectives defined for VRM Class I and II include the preservation or retention of the existing character of the landscape and, therefore, minimize and at times prohibit surface-disturbing activities. Those impacts to vegetation resources associated with mineral development, ROW construction and maintenance and other land use authorizations and road and trail construction would be minimized within these VRM Class I and II designations. The number of acres designated as VRM Class I and II vary across the alternatives and is depicted in Table 4-30.

Table 4-30. VRM Management Decisions (acres) on BLM Surface Lands by Alternative

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***45,809***	***236,344***	***293,805***	***116,155***	***77,595***

Impacts from Management Common to All

There are no proposed management decisions common to all alternatives that would significantly impact vegetation resources because prescriptions here address utility corridors, pipelines, etc., in leased areas with scenic quality.

Impacts from Management Common to All Action Alternatives

There are no management decisions common to all action alternatives proposed.

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 50,671 acres would be designated under either VRM Class I or II (see Table 4-30). Upland vegetation would benefit from additional management prescriptions that would prohibit or minimize surface-disturbing activities within these designated acres. Various impacts on vegetation associated with surface-disturbing activities include disruptions in plant community composition, bare ground, increased erosion and sedimentation, and an increase in the likelihood of noxious weed invasion.

Impacts from Alternative A

Under Alternative A, a total of 273,709 acres would be designated under either VRM Class I or II. Qualitatively, the impacts to upland vegetation and noxious weeds management would be the same as those under the No Action Alternative; however, the magnitude of beneficial impacts would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designations.

Impacts from Alternative B

Under Alternative B, a total of 357,803 acres would be designated under either VRM Class I or II. Qualitatively, the impacts to upland vegetation and noxious weeds management would be the same as those under the No Action Alternative; however, the magnitude of beneficial impacts would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designations.

Impacts from Alternative C

Under Alternative C, a total of 67,963 acres would be designated under either VRM Class I or II. Qualitatively, the impacts to upland vegetation and noxious weeds management would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be slightly greater under this alternative because there is a 26% increase in the number of acres under the VRM Class I and II designations.

Impacts from Alternative D

Under Alternative D, a total of 48,263 acres would be designated under either VRM Class I or II. Qualitatively, the impacts to upland vegetation and noxious weeds management would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be slightly smaller under this alternative because there is a 5% decrease in the number of acres under the VRM Class I and II designations.

Impacts of Renewable Energy on Upland Vegetation/Noxious Weeds Management

Impacts from Management Common to All

All management common to all decisions would potentially provide some beneficial impacts to upland vegetation resources and noxious weeds management that are part of LPC and/or DSL habitat, as all applications to permit either solar or wind energy sites across the planning area would require the demonstration that proposed projects would not adversely impact these species' habitats. Vegetation communities within these species' habitat would benefit from additional protections.

Adoption of programmatic policies and BMPs in both the Solar Energy Development Programmatic EIS ROD (BLM 2012a) and the Wind Energy Development Programmatic EIS ROD (BLM 2005) would also potentially minimize adverse impacts to upland vegetation resources across the planning area.

Impacts from Management Common to All Action Alternatives

Proposed management under all of the action alternatives includes the encouraged placement of wind development projects in areas where transmission corridors are already located and where transmission systems are already in place. As a result, adverse impacts to upland vegetation and noxious weeds management, such as reduction in ground cover, reduced vegetation health and vigor, habitat fragmentation, and an increased likelihood in noxious weeds invasion, would be minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, restrictions on the location of solar or wind energy sites would continue to be implemented on specific sites across the planning area. These include WSAs, WSRs, VRM Class I and II areas, and areas with known karst occurrences (for complete list of restrictions, see Chapter 2, Alternatives Matrix). In addition, applications to permit either solar or wind energy sites on public land within the planning area would be considered only if the applicant can demonstrate no negative impacts on avian and bat species. All of these management prescriptions would benefit upland vegetation and noxious weeds management by minimizing surface disturbance and its associated adverse impacts as those described under management common to all action alternatives.

Impacts from Alternative A

Under Alternative A, the BLM would exclude approximately 666,783 acres from wind development. Approximately 768,020 acres would be excluded from solar and 995,285 acres would be closed to geothermal development. Solar, wind, and geothermal development would be excluded in areas with sensitive soils, not only in SMAs as is the case under the No Action Alternative.

Compared to the No Action Alternative, the magnitude of beneficial impacts to upland vegetation and noxious weeds management would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative.

Though the No Action Alternative prohibits solar development projects on a larger number of acres, the Solar Energy Development Programmatic EIS ROD (BLM 2012a) states most of the planning area would not be suitable for support solar development, thus greater number of acres closed to solar development is irrelevant.

Impacts from Alternative B

Under Alternative B, the BLM would exclude approximately 912,860 acres from wind development. Approximately 833,305 acres would be excluded from solar and 1,372,791 acres would be closed to geothermal development. Solar, wind, and geothermal development would be excluded in all areas with sensitive soils.

Compared to the No Action Alternative, the magnitude of beneficial impacts to upland vegetation and noxious weeds management would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative.

Impacts from Alternatives C and D

Under Alternative C, the BLM would exclude approximately 206,184 acres from wind development. Approximately 734,636 acres would be excluded from solar and 608,850 acres would be closed to geothermal development. Under Alternative D, approximately 73,143 acres would be excluded from wind development. Under Alternative D, approximately 630,302 acres would be excluded from solar and 464,187 acres would be closed to geothermal development. Wind development would be avoided in areas with sensitive soils while solar development would be excluded.

Compared to the No Action Alternative, the magnitude of beneficial impacts to upland vegetation and noxious weeds management would be potentially greater because all sensitive soils would be avoided, and wind development would be prohibited on a substantially larger number of acres under this alternative.

4.2.3.2 Riparian and Wetland Vegetation

This section discusses impacts to riparian vegetation and wetland communities from BLM management actions for other resources. Existing riparian and wetland communities are discussed in detail in Chapter 3, while BLM proposed management actions are discussed in detail in Chapter 2. Riparian vegetation differs from upland vegetation above in that it is restricted to riparian and wetland environments and is characterized by obligate phreatophyte species that require permanent surface or near-surface water. Within the planning area, riparian areas are typically associated with perennial, intermittent, and ephemeral streams, as well as isolated springs and other water sources.

This analysis evaluates management decisions with the potential to impact riparian and wetland vegetation, the riparian PFC of streams, water resources necessary to riparian zone establishment and survival, or the physical environment on which riparian and wetland vegetation depends.

4.2.3.2.1 Analysis Methods

Indicators

The following indicators were used for the analysis of impacts to riparian and wetland vegetation from the management actions proposed under the alternatives:

- For the purposes of this broad-scale analysis, the primary indicator of impacts to riparian and wetland vegetation is the number of acres of surface disturbance resulting from proposed management actions (including mineral development, livestock grazing, and OHVs) across the planning area, particularly surface disturbance that occurs in upland areas that would impart indirect adverse impacts to riparian and wetland areas downslope.
- Riparian resources will be managed as part of riparian PFC ratings based on hydrology, riparian vegetation, and erosional/depositional balances. Any changes to riparian resources that would negatively affect its PFC rating would also be an impact indicator.

Methods and Assumptions

Management actions associated with the following resources and resource uses may result in impacts to riparian and wetland vegetation and are discussed in detail below: land use authorizations, mineral development, livestock grazing, lands with wilderness characteristics, renewable energy, recreation, special designations, visual resources, and travel management.

The following resources and resource uses are not discussed in detail because there are no management decisions identified in Chapter 2 that would impact riparian and wetland vegetation: air resources, karst resources, wildland fire management, upland vegetation and noxious weeds, riparian resources, special status species, fish and wildlife, soils and water resources, paleontological and cultural resources, health and safety, and land tenure. As a result, they are not discussed in detail below.

The following assumptions were used for the analysis of management action impacts to riparian and wetland vegetation:

- The more soil surface disturbance in any given watershed (e.g., livestock grazing, high severity wildfire, OHVs, mineral extraction, etc.), the greater the probability that precipitation surface runoff and erosion will increase because of that disturbance, resulting in the degradation of downslope stream stability and function and contributing to the loss of riparian and wetland health and functionality (DeBano and Schmidt 1989a, 1989b; DeBano et al. 2004).
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location within the watershed, duration, and degree of disturbance, vegetation health, soil type, precipitation, and mitigating actions applied to the disturbance (DeBano et al. 2004).
- The presence of invasive exotic saltcedar would increase the risk for wildfire in riparian areas because saltcedar is flammable and burns very hot, killing most associated native riparian trees. Saltcedar resprouts from root crowns following fire, and outcompetes native woody riparian plant species. Prescribed fire alone is not a valid management tool to control saltcedar in riparian areas (U.S. Forest Service 2012).
- Saltcedar leaf beetles (*Diorhabda* sp.; mostly *D. elongata*) are currently expanding into the planning area from the south along the Pecos River. Saltcedar leaf beetles reduce the cover and spread of saltcedar over time and would, therefore, reduce the need for saltcedar control management actions in riparian areas over the next 20 years (Tamarisk Coalition 2014).

4.2.3.2.2 Direct and Indirect Impacts

Management actions for resources or resource uses that result in surface disturbances within watersheds and areas adjacent to riparian and wetland systems, would lead to both direct and indirect adverse impacts to riparian and wetland vegetation. Alterations in upland watershed runoff, resulting from surface disturbances, would indirectly impact riparian areas and wetlands, as increased runoff from compacted or denuded surfaces leads to erosion and excessive sediment and contaminant delivery to nearby waterways. The greater the amount of watershed surface disturbance, the greater the potential for impacts to riparian and wetland areas and riparian and wetland vegetation downslope.

Other impacts to riparian and wetland vegetation from surface-disturbing activities, such as mineral exploration and development and livestock grazing, would include changes to quantity and quality (water chemistry) of surface water, potential changes to water volume and velocity, alterations in channel morphology through changes in surface drainage patterns, and reduction in overall watershed health. Loss of vegetation or prevention of revegetation would potentially lead to an increase in or introduction of invasive, non-native species that often have greater water requirements than native plants and would, therefore, potentially outcompete them. Industrial contaminants, chemicals associated with vehicles, nutrients and pathogens from livestock, and herbicides for vegetation treatments can migrate to surface water bodies, potentially degrading the PFC rate of some riparian and wetland systems.

Over the next 20 years, climate change alone may alter water availability to riparian areas and wetlands, and cause shifts to more xeric and warmer temperature adapted species. Climate change will likely affect grazing management as grass forage and stock water availability decline, causing livestock to congregate even more in riparian and wetland areas.

Impacts of Livestock Grazing Actions on Riparian and Wetland Vegetation

The removal of livestock from riparian habitats would provide both direct and indirect beneficial impacts to riparian and wetland vegetation because erosion, sedimentation, soil compaction and trampling of streambank vegetation, and degradation of water quality—all of which are associated with livestock grazing (Belsky et al. 1999)—would be reduced. In areas where livestock grazing is continuous, plant community composition would be potentially altered in favor of species better adapted to trampling and soil compaction disturbance, and also through the introduction and spread of both exotic and native weeds (USFS 2012) and Russian olive (*Elaeagnus angustifolia*) (Pearce and Smith 2001).

In semiarid regions such as the planning area, livestock tend to congregate in riparian and wetland areas because of increased water and forage availability. Livestock intensify their vegetation consumption, trampling, and defecating activities in riparian areas and wetlands (Elmore and Kauffman 1994; Bellows 2003; Clary and Kruse 2004). Livestock tend to not forage on the exotic invasive noxious weeds saltcedar and Russian olive (Pearce and Smith 2001; USFS 2012). As a result, those noxious weeds benefit from livestock activity in riparian and wetland areas. High stocking rates of livestock in watersheds tend to cause declines in upland vegetation cover; this leads to increased erosional soil runoff into riparian areas, which causes indirect adverse impacts to riparian and wetland vegetation. Some of these adverse impacts would include soil erosion and loss of streambank stability, declines in riparian and wetland-adapted plant species, increased noxious weeds and non-native plant species, sediment loading in water, water quality alterations, and the potential for large-scale changes in downstream ecosystems (DeBano and Schmidt 1989a, 1989b).

Specific riparian areas may be open or closed to livestock grazing, depending on the alternative. Table 4-31 below depicts areas associated with particular river systems across the planning area and livestock grazing management actions across the alternatives.

Table 4-31. Riparian Areas across the Planning Area by Alternative

Riparian/River Areas	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Pecos River	Open to grazing, with exception of the research natural areas of the Pecos River Canyons, bluntnose shiner habitat, and Red Bluff Area	Number of livestock and season of use to be established on allotment basis to ensure adequate growing season rest	Same as Alternative A	Same as Alternative A	Same as Alternative A
Black River Management Area	Closed to grazing	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Delaware River (both sides of U.S. 285)	Livestock grazing not permitted from November to March	Same as No Action Alternative	Removal of livestock grazing from seasonal pastures	Livestock grazing permitted from November to March	Same as No Action Alternative
Small portion along Black River (outside Black River Management Area)	Open to livestock grazing	Removal of livestock grazing within 656 feet of the river bank on either side	Same as Alternative A	Same as No Action Alternative	Same as No Action Alternative

Impacts from Management Common to All

Livestock grazing management actions common to all alternatives would include the closure of the Black River Management Area to grazing. This management decision would reduce the potential for adverse impacts to riparian and wetland vegetation, including subsequent alterations in water quality, changes in species' composition, and movement away from PFC.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, the number of livestock and season of use on the Pecos River would be established on an allotment basis to ensure adequate growing season rest (see Table 4-31). Additionally, all riparian springs and their associated riparian zones would be closed to grazing. These actions would indirectly benefit riparian and wetland vegetation by reducing the magnitude of negative impacts associated with livestock grazing, as previously described.

Impacts from the No Action Alternative

Under the No Action Alternative, current livestock grazing management prescriptions would remain in place and include keeping 5,000 acres of unallotted tracts open to livestock grazing. This alternative would also include the continued exclusion of livestock grazing on 4,969 acres across 13 SMAs. Also included would be the authorization of approximately 350,000 AUMs to 200 permittees and approximately 18,000 AUMs to 62 lessees. These numbers would be supported by quantitative field monitoring, and any future increase or decrease in authorized numbers would need to be backed with similar data.

Adverse impacts to riparian and wetland vegetation, including increased erosion, sedimentation, water depletion, and loss of streamside vegetative cover, would continue in riparian areas that remain open to livestock grazing.

Additionally, under the No Action Alternative, the BLM would open the Pecos River to grazing, with the exception of specific Research Natural Areas (RNAs) in the Pecos River canyons and the Red Bluff area. Approximately 201 acres of the Pecos Bluntnose Shiner ACEC would be open to grazing. Livestock grazing would not be permitted from November through March on the Delaware River and a small portion along the Black River would be open to livestock grazing (see Table 4-31). Adverse impacts associated with livestock grazing, as described above, would continue in the areas open to grazing. Approximately 5,226 acres would be closed to livestock grazing.

Impacts from Alternative A

As with the No Action Alternative, livestock grazing would not be permitted along the Delaware River from November to March (see Table 4-31). In this case, impacts would be the same as those under the No Action Alternative; however, under Alternative A, livestock grazing would be removed from within 656 feet on either side of a small portion along the Black River. Compared with the No Action Alternative, which keeps this portion of the Black River open to grazing, the magnitude of beneficial impacts would be greater under this alternative.

Impacts from Alternative B

Under Alternative B, unallotted tracts encompassing 5,000 acres would remain open to grazing, as is the case under the No Action Alternative. Under this alternative, sections within 0.25 mile of riparian areas would be closed to livestock grazing, including areas around the Pecos, Black, and Delaware Rivers. Other areas closed to livestock grazing that are important riparian habitat include the Cottonwood Day Use Area, Laguna Plata ACEC, known heronries, Pecos Bluntnose Shiner ACEC, and Pope's Well ACEC. Impacts to riparian and wetland vegetation would be qualitatively similar to those described under the No Action Alternative. However, quantitatively, the magnitude of beneficial impacts would be greater because of the additional acres that would be closed to livestock grazing.

Additionally, livestock would be removed from seasonal pastures around the Delaware River and within 656 feet of the river bank (on either side) of a small portion of the Black River (see Table 4-31). Compared with the No Action Alternative, which keeps this portion of the Black River and also permits grazing along the Delaware River from November to March, the magnitude of beneficial impacts in relation to these rivers would be greater under this alternative.

Impacts from Alternative C

Under Alternative C, approximately 8,115 acres would be closed to livestock grazing, including the Pecos Bluntnose Shiner ACEC. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Additionally, livestock grazing would be removed from all riparian pastures along both sides of the Delaware River during the active season (April–October) but would be allowed during the dormant season (November–March), and the BLM would negotiate with the grazing permittee to fence the south side of the river and provide off-site water. As with the No Action Alternative, a small portion of the Black River would be open to grazing. Qualitatively, impacts to riparian and wetland vegetation, as described under the No Action Alternative, would remain the same under Alternative C. Quantitatively, however, adverse impacts to riparian and wetland vegetation would be greater because of the additional acres of important riparian/watershed areas open to grazing under this alternative, compared with the No Action Alternative.

Impacts from Alternative D

Under Alternative D, 3,594 acres would be closed to livestock grazing, including a portion of the Black River Management Area and the Pecos Bluntnose Shiner ACEC. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing.

Qualitatively, impacts to riparian and wetland vegetation as described under the No Action Alternative would remain the same under Alternative D. Quantitatively, however, adverse impacts to riparian and wetland vegetation would be greater under Alternative D because of the additional 4,234 acres of important riparian/watershed areas open under this alternative, compared with the No Action Alternative.

Impacts of Recreation/Travel Management Actions on Riparian and Wetland Vegetation

Recreation management can impact riparian and wetland vegetation in various ways. Human activity along or within streams and rivers, and around or within ponds, lakes, and reservoirs, can result in habitat alteration, reduction or loss of riparian vegetation cover and subsequent erosional runoff, increased sedimentation, and turbidity.

Acreages across the planning area designated as SRMAs or as ERMAs would not directly or indirectly impact riparian and wetland vegetation, as recreational use of these areas would not be expected to increase or decrease as a result of designation. However, proposed management actions associated with travel management may indirectly affect riparian and wetland vegetation both within and outside these RMAs and are addressed below in Table 4-32.

Travel management would potentially cause adverse impacts to riparian and wetland vegetation, as the presence of trails and roads within watersheds may lead to habitat alteration, loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, and water quality degradation. Roads and trails provide a means for water conveyance, which accelerates flow velocities and increases erosion and offsite soil movement. These routes also compact soils, which reduce water absorption and infiltration rates and increase the peaks of runoff flows. Where motorized and, in some cases, mechanized use are high and/or increasing, erosion potential is increased. These impacts are amplified where user-created routes and OHV use is occurring or increasing. In areas where OHV use is occurring or would increase, impacts such as sedimentation and turbidity, soil compaction, loss of riparian vegetation and cover, habitat alteration, and water quality changes would be long term and chronic.

The number of acres limited or closed to OHV travel across the planning area varies by alternative and is presented below in Table 4-32.

Table 4-32. Travel Management Allocations (acres) by Alternative

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Impacts from Management Common to All

Under management common to all alternatives, proposed management actions would include preparing RAMPs for all designated SRMAs under management common to all. The purpose of SRMAs is to focus management, better direct people to opportunities, and coordinate recreation activities with other multiple uses in the area. The RAMPs that would be prepared for the designated SRMAs identify specific recreation implementation actions, including permitting or use allocation decisions. As part of an RAMP preparation, other resources and resource use issues are considered, which generally provides for mitigation of impacts due to recreation activities proposed under SRMAs. Therefore, it is unlikely that there would be any adverse impacts from the development of RAMPs to riparian and wetland vegetation.

Additionally, all activities would adhere to BLM New Mexico Supplementary Rules, which provide for several safety and procedural parameters for activities on public lands, such as no construction of pit toilets lasting more than 14 days within 100 feet of any permanent water source, no fireworks, and no cutting or removal of woody materials. All of these rules would reduce or prevent adverse impacts to riparian and wetland vegetation from water contamination and sediment loading.

Additionally:

- The Black River SRMA (1,275 acres) would be closed to OHV, equestrian use, and grazing, which would reduce the potential for impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants.
- The Conoco Lake SRMA (7 acres) would prohibit firewood collection and allow fires in grills only (subject to fire restrictions), which would help reduce the potential for wildfire in riparian and wetland areas.
- Phantom Banks Heronries would be designated as limited to OHV use, and a plan would be implemented to protect active heronries through seasonal limitations to designated routes. Emergency OHV limitations may also be imposed in problem areas. Restrictions on OHV access would reduce the potential for adverse impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants.
- Within the planning area, motorized wheeled cross-country travel would be allowed for any military, fire, search and rescue, or law enforcement vehicle used for emergency purposes. Allowing motorized access would increase the potential for impacts to riparian vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Impacts from Management Common to All Action Alternatives

All action alternatives in the planning area would maintain water quality in natural water sources by prohibiting camping within 900 feet of these areas (excluding the Pecos River). This would benefit riparian and wetland vegetation by reducing disturbance in close proximity to these areas, as well as maintaining or improving water quality, reducing sedimentation, and contributing to the overall health of riparian ecosystems near recreational areas.

Additionally, roads would be constructed and maintained in accordance with the BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development – The Gold Book* (BLM 2007a). Additionally, all surfacing material on oil and gas roads must be removed at the time of abandonment. Both of these management actions would lead to indirect beneficial impacts to riparian and wetland vegetation by minimizing the potential for erosion, runoff, and contamination of streams, rivers, and other water bodies that provide habitat for fish.

Impacts from the No Action Alternative

Under the No Action Alternative, 55,966 acres in the planning area would be closed to OHV use, whereas 2,035,307 acres would be managed as OHV limited (see Table 4-32). In general, as road density increases, adverse impacts to riparian and other aquatic habitats would potentially increase as well.

Alkali Lake would be managed as OHV limited (944 acres). OHV use would increase the potential for impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants. It would also be managed with 944 acres open with moderate constraints to leasables with standard terms and condition and 944 acres open to salables with special terms and conditions. Fewer acres managed for mineral exploration and development means less potential for impacts to riparian and wetland vegetation from surface disturbance caused by these activities. It would also be managed as open for ROW development. Fewer acres managed for ROW means less potential for impacts to riparian and wetland vegetation from ROW-related surface disturbance.

Pecos River Corridor would be managed as an SRMA and surface disturbance would be restricted throughout the SRMA to reduce erosion and minimize impacts to riparian and wetland habitat. Reducing surface disturbance would reduce the potential for the impacts to riparian and wetland vegetation. Approximately 120 acres around the Red Bluff Reservoir would be closed to OHV use, and the remaining 5,880 acres would be managed as OHV limited. Restricting OHV use would reduce the potential for impacts to riparian vegetation and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Dispersed use would be allowed in the Pecos River Equestrian ERMA (11,207 acres), but no developed trails would be allowed. Likewise, dispersed use would be allowed in the Hay Hollow area (12,913 acres), but no trails would be developed. Fewer trails means less potential for impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Impacts from Alternative A

Under Alternative A, approximately 2,039,299 acres would be OHV limited and 52,028 acres would be closed to travel. Compared to the No Action Alternative, the magnitude of impact would be slightly greater because of 0.2% decrease in the number of acres closed to travel.

Alkali Lake SRMA (318 acres) would be managed as NSO for leasable mineral development, closed to salable development, and as a ROW exclusion area. The greater the number of acres excluded from mineral development and ROW actions the less the potential for impacts to riparian and wetland vegetation from ROW-related surface disturbance.

The Pecos River Corridor SRMA (9,936 acres) would be managed to provide recreation opportunities on public land parcels, with an emphasis on natural and scenic qualities. Travel in the SRMA would be OHV limited, which would help limit impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants. Approximately 9,118 acres would be managed as open with major constraints for fluid leasables and closed to locatable and salable development. More restrictions on mineral exploration and development means less potential for impacts to riparian and wetland vegetation from surface disturbance caused by these activities.

Square Lake (2,975 acres) would be managed as an ERMA with an objective to limiting OHV travel on approximately 2,975. Approximately 2,973 acres would be open with moderate constraints to leasable mineral development. Approximately 2,973 acres would be open to locatable and 2,975 acres would be closed to salable mineral development. Fewer acres managed for mineral exploration and development means less potential for impacts to riparian and wetland vegetation from surface disturbance caused by these activities.

The Pecos River Equestrian Trail and Hay Hollow Equestrian ERMAs would be managed as described under the No Action Alternative; therefore, impacts would be the same.

Impacts from Alternative B

Under Alternative B, approximately 2,049,391 acres would be OHV limited and 41,936 acres would be closed to travel. Compared to the No Action Alternative, the magnitude of impact would be slightly greater because of a 0.7% decrease in the number of acres closed to travel.

Alkali Lake would be managed as SRMAs, with the same prescriptions as Alternative A.

Square Lake (2,975 acres) and the Pecos River Equestrian Trail would be managed as ERMAs. Approximately 7,954 acres would be a ROW avoidance area. Fewer acres managed for ROW means less potential for impacts to riparian and wetland vegetation from ROW-related disturbance.

Hay Hollow equestrian trail (12,913 acres) would be managed as an ERMA, with potential trail and facility development.

Impacts from Alternative C

Under Alternative C, approximately 2,052,582 acres would be OHV limited, and 38,738 acres would be closed to travel. Compared to the No Action Alternative, the magnitude of impact would be greater because of a 0.8% decrease in the number of acres closed to travel.

Alkali Lake (1,341 acres) would be managed as an SRMA and 1,333 acres would be open to locatable mineral development, which could increase the potential for impacts to riparian and wetland vegetation, such as crushing and the spread of noxious weeds and invasive plants.

Hay Hollow equestrian ERMA would be managed the same as under the No Action Alternative with 12,911 acres limited to existing travel.

Square Lake would be managed as an ERMA, with 5,285 acres managed as limited to existing travel.

Impacts from Alternative D

Under Alternative D, approximately 2,052,584 acres would be managed as limited and 38,737 acres would be closed to OHV use. Compared to the No Action Alternative, the magnitude of impact would be greater because of a 0.8% decrease in the number of acres closed to travel.

Impacts of Land Use Authorization Actions on Riparian and Wetland Vegetation

Land use authorizations generally include a number of activities and features, such as access roads, transmission lines, and pipelines, along with ROWs, that would result in surface disturbances and vehicle and equipment transportation. Both of the latter could contribute to adverse impacts to riparian and wetland vegetation. Potential impacts would include direct loss of riparian vegetation and topsoil, reduced native plant diversity, habitat fragmentation, soil compaction and increased erosion, and an increased likelihood of noxious weed invasion. Additional impacts to riparian soils and native vegetation would be perpetuated over time by maintenance activities for those features. Management decisions to avoid or exclude certain areas from ROWs would have beneficial impacts to riparian and wetland vegetation (Table 4-33).

Table 4-33. Avoidance and Exclusion Areas for Land Use Authorizations (acres) by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoidance	30,965	629,149	413,654	313,619	270,360
Exclusion	7,056	662,038	918,701	165,378	69,540

Impacts from the No Action Alternative

Under the No Action Alternative, six ROW corridors have already been designated by the BLM as preferred locations for all new major utility and transportation facility alignments. A total of 30,965 acres would continue to be designated as avoidance areas and 7,056 acres (all WSAs) would continue to be designated as exclusion areas. These designations would benefit riparian and wetland vegetation by minimizing ROW construction and associated disturbance near or within these important habitat areas.

Impacts from Alternative A

Under Alternative A, 629,149 acres would be designated as avoidance areas and 662,038 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative A would provide significantly fewer adverse impacts to riparian and wetland vegetation through protection of important ecosystem components.

Impacts from Alternative B

Under Alternative B, 413,654 acres would be designated as avoidance areas and 918,701 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative B would provide significantly fewer adverse impacts to riparian and wetland vegetation through protection of important ecosystem components.

Impacts from Alternative C

Under Alternative C, 313,619 acres would be designated as avoidance areas and 165,378 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative C would provide fewer adverse impacts to riparian and wetland vegetation through protection of important ecosystem components.

Impacts from Alternative D

Under Alternative D, 270,360 acres would be designated as avoidance areas and 69,540 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative D would provide fewer adverse impacts to riparian and wetland vegetation through protection of important ecosystem components.

Impacts of Leasable, Salable, and Locatable Minerals Actions on Riparian and Wetland Vegetation

Direct impacts of mineral management actions would be the removal of all natural vegetation on disturbed surface acres. Indirect impacts of mineral management actions would be the upland area soil disturbance effects on watershed vegetation, including loss of topsoil, and runoff, erosion, and sediment loading to riparian areas and wetlands.

In general, surface disturbance related to mineral extraction could potentially reduce water quality and riparian condition (PFC), causing both short- and long-term impacts to riparian and wetland vegetation, including water depletions and increased sedimentation and turbidity. Of primary concern are activities that would result in ground disturbance and the removal of native vegetation for the construction of well pads, roads, pipelines, compressor and relay stations, settling ponds, and various assorted infrastructure. Collectively, all of these activities have the potential to contribute to off-site movement of soils and increase sediment loading and turbidity into nearby water bodies. In addition, they provide opportunities for invasive vegetation and noxious, non-native species to take hold. This reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption.

An increase in the numbers and densities of roads would be a concern because they can increase the potential for movement of contaminants via vehicular travel and may serve as water conveyance corridors to live streams and the ephemeral drainages that ultimately feed live streams. Impacts are amplified and more acute in areas where natural gas development is occurring in small, discrete watersheds. Generally, where proper and timely reclamation is occurring at well pad and pipeline sites, and where proper road construction and maintenance is occurring, adverse impacts from off-site soil movement and sediment and turbidity are minimized.

Surface disturbance from the various minerals management actions would have similar impacts to riparian and wetland vegetation, and all are analyzed as one category of impact—analysis of management action acreages for the three mineral categories: 1) leasable, 2) salable, and 3) locatable (Table 4-34–Table 4-37).

Table 4-34. Number of Predicted Wells, Total Predicted Surface Disturbance, and Total Predicted Water Use by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Number of predicted wells on **BLM-administered surface lands only** (based on % of land open to surface disturbance)	5,874	4,465	3,538	5,832	6,044
Total predicted surface disturbance/acres after reclamation on **BLM-administered surface lands only**	8,636	6,565	5,202	8,575	8,887
Total predicted water use (acre-feet)	***38,811***	***29,503***	***23,379***	***38,538***	***39,937***

Table 4-35. BLM Surface Acreage Opened and Closed to Leasable Mineral Management Decisions by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Open with moderate constraints (CSU)	956,410	799,649	449,759	786,381	631,634
Open with major constraints (NSO)	54,602	80,394	162,013	158,401	70,142
Closed	174,391	761,404	1,082,972	88,502	84,687
Total	***2,784,273***	***2,784,248***	***2,784,224***	***2,784,058***	***2,784,145***
% of planning area closed	***8%***	***36%***	***52%***	***4%***	***4%***

Table 4-36. BLM Surface Acreage Opened and Closed to Salable Mineral Management Decisions by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,637,465	1,160,064	1,121,118	1,784,431	2,028,324
Avoid (open with special terms and conditions)	–	1,062,192	726,270	752,286	602,621
Closed	146,568	561,995	936,799	247,323	153,174
Total	***2,784,033***	***2,784,251***	***2,284,186***	***2,784,041***	***2,784,119***
% of planning area closed	***7%***	***27%***	***45%***	***12%***	***7%***

Table 4-37. BLM Surface Acreage Opened and Closed to Locatable Mineral Management Decisions by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open to mineral entry	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
Recommended (or previously recommended for withdrawal)	32,374	380,990	673,996	132,249	122,444
Total	***2,784,229***	***2,784,105***	***2,784,094***	***2,784,104***	***2,784,149***
% of planning area recommended	***1.5%***	***18%***	***32%***	***6%***	***6%***

Impacts from the No Action Alternative

Under the No Action Alternative, approximately 5,874 wells and 8,636 acres of surface disturbance are predicted, along with 38,811 of water use in acre-feet (see Table 4-34). Approximately 8% of the total planning area would be closed to leasable mineral development, 7% to salable mineral development and approximately 1.5% would be recommended for withdrawal from locatable mineral development. The greater the number of acres of surface disturbance, the greater the potential for indirect adverse impacts to riparian and wetland vegetation.

Impacts from Alternative A

Under Alternative A, 4,465 wells and approximately 6,565 acres of surface disturbance after reclamation are predicted on BLM-administered surface lands. Total predicted water use is 29,503 acre-feet. A total of 36% of the planning area would be closed to leasable mineral development, 27% closed to salable mineral development, and 18% would be recommended for withdrawal from locatable mineral development (see Table 4-34).

Compared with the No Action Alternative, there would be a 24% reduction in surface disturbance and water use under Alternative A. The magnitude of adverse impacts (as those described above) to riparian and wetland vegetation would be greater under the No Action Alternative than under Alternative A.

Impacts from Alternative B

Under Alternative B, 3,538 wells and approximately 6,936 acres of surface disturbance are predicted on BLM-administered surface lands. Total predicted water use would be 23,379 acre-feet. Approximately 52% of the entire planning area would be closed to leasable mineral development, 45% closed to salable mineral development, and 32% recommended for withdrawal from locatable mineral development.

Compared with the No Action Alternative, there would be a 20% reduction in surface disturbance and water use under Alternative B. The magnitude of adverse impacts (as those described above) to riparian and wetland vegetation would be greater under the No Action Alternative than under Alternative B.

Impacts from Alternative C

Under Alternative C, 5,832 wells and approximately 8,575 acres of surface disturbance are predicted on BLM-administered lands. Total predicted water use would be 38,538 acre-feet. A total of 4% of the entire planning area would be closed to leasable mineral development, 12% closed to salable mineral development, and 6% recommended for withdrawal from locatable mineral development.

Compared with the No Action Alternative, there would be a 1% reduction in surface disturbance and water use under Alternative C. The magnitude of adverse impacts (as those described above) to riparian and wetland vegetation would be slightly greater under the No Action Alternative than under Alternative C.

Impacts from Alternative D

Under Alternative D, 6,044 wells and approximately 8,887 acres of surface disturbance are predicted on BLM-administered lands. Total predicted water use would be 39,937 acre-feet. Only 4% of the entire planning area would be closed to leasable mineral development, 7% closed to salable mineral development, and 6% recommended for withdrawal from locatable mineral development.

Under Alternative D, the acres of predicted surface disturbance are 3% greater under this alternative compared to the No Action Alternative. Predicted water use is also 3% greater under this alternative, compared with the No Action Alternative; therefore, the magnitude of adverse impacts to riparian and wetland vegetation would be greater under Alternative D, compared with the No Action Alternative.

Impacts of Special Designations Actions on Riparian and Wetland Vegetation

Special designation areas, such as ACECs, SMAs, and WSRs, would generally have long-term positive impacts on riparian and wetland vegetation that occur within their boundaries by limiting or preventing surface-disturbing activities, such as mineral development, OHV travel, and livestock grazing. Adverse impacts to riparian and wetland vegetation associated with these activities would include reduction in water quality and movement away from PFC.

Management goals within special designations would include the protection of relevant and important water resources and natural systems. These additional protections to riparian ecosystems and other water bodies would benefit riparian and wetland vegetation, as water quality and other ecosystem components are maintained or enhanced. Adverse impacts to riparian and wetland vegetation, such as habitat and water quality alterations, reduction in streamside vegetation, and excessive sediment loading and turbidity, within these designations would be minimized.

Areas of Critical Environmental Concern

ACECs are managed to protect the relevant and important values for which the ACEC would be designated such as wildlife, special status species, etc. ACEC designation would generally protect and benefit riparian and wetland vegetation from adverse impacts. The various ACECs each have specific management goals and management actions. ACEC management actions generally would have reduced direct and indirect impacts to upland vegetation and, subsequently, riparian and wetland vegetation.

Impacts from Management Common to All

There are no proposed management actions for ACECs listed under impacts from management common to all alternatives.

Impacts from Management Common to All Action Alternatives

There are no proposed management actions for ACECs listed under impacts from management common to all action alternatives.

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 13,435 acres would continue to be designated as ACECs. Adverse impacts, such as those described above, to riparian and wetland vegetation would be minimized within these approximately 13,400 acres.

Impacts from Alternative A

Under Alternative A, approximately 495,042 acres would be designated as ACECs. Qualitatively, this alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative because of the substantial increase in number of acres designated as an ACEC.

Impacts from Alternative B

Under Alternative B, approximately 561,433 acres would be designated as ACECs. Qualitatively, this alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be exponentially greater due to the substantial increase in number of acres designated as an ACEC.

Impacts from Alternative C

Under Alternative C, approximately 98,562 acres would be designated as ACECs. Qualitatively, this alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be much greater because of the increase in number of acres designated as an ACEC.

Impacts from Alternative D

Under Alternative D, approximately 28,894 acres would be designated as ACECs. Qualitatively, this alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be slightly greater because of the 107% increase in number of acres designated as an ACEC.

Impacts of Wilderness Study Areas on Riparian and Wetland Vegetation

Impacts from Management Common to All

All riparian and wetland vegetation within the four designated WSAs, totaling 7,086 acres, would continue to benefit from additional protection through special management requirements, including a closed designation for all future leases and no reissuing of current leases once expired, which would enhance and preserve its wilderness values, including plant communities within the unit. In addition, new permanent facilities and new surface disturbance would be prohibited, all of which would provide beneficial impacts to riparian and wetland areas within the units, including decreased sedimentation loading and erosional runoff, decreased potential for declining water quality, and movement toward PFC.

Impacts from the No Action Alternative

Under the No Action Alternative, the four WSAs would remain under their current designation and managed according to BLM Handbook 6330 – Management of Wilderness Study Areas. Managing per the handbook would continue to minimize adverse impacts to riparian and wetland vegetation through restrictions on surface-disturbing activities.

Impacts from Alternatives A, B, and C

If the WSA designation is removed, the four previously designated WSAs would be managed as closed to leasable and salable development, recommended for withdrawal for locatable development, and excluded/closed for renewable development and ROWs. Adverse impacts under these three alternatives would be comparable to those under the No Action Alternative and as described under management common to all.

Impacts from Alternative D

Under Alternative D, adverse impacts resulting from loss of WSA designation would be greater than those found under the other alternatives because management prescriptions would be less stringent for surface-disturbing activities. Unlike the other four alternatives, leasable development would be open with major constraints and salable development would be open with special terms and conditions. In addition, the proposed VRM class on these lands would be Class III.

Adverse impacts, such as those described under management common to all alternatives, would be greater under Alternative D, compared with the No Action Alternative.

Impacts of Wild and Scenic Rivers on Riparian and Wetland Vegetation

Impacts from Management Common to All

There are no proposed management decisions common to all alternatives that would significantly impact riparian and wetland vegetation because management prescriptions here address decisions made in Congress pertaining to WSR designations.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, the Black River would be recommended as suitable for inclusion in the NWSRS and would be given the same management prescriptions as other WSR areas, including a VRM Class I classification. Beneficial impacts to riparian and wetland vegetation would occur, as the WSR designation would limit surface-disturbing activities that would potentially result in adverse impacts, such as decreased water quality and movement away from PFC, increased erosional runoff and sediment loading, and alterations in stream hydrology.

Impacts from the No Action Alternative

Under the No Action Alternative, the Black River would continue to not be managed as part of the NWSRS but would be managed to protect its eligibility as a WSR until a suitability determination is made in this RMP. The Black River would be managed with the following management prescriptions: designation as

VRM Class III, closed to salable development, and recommended for withdrawal for locatable mineral development, with leasable mineral development open with major constraints. All ROW construction would continue to be designated under "avoidance" within WSR areas, and all renewable energy development would be excluded. The Delaware River would also not be managed as part of the NWSRS but would also be managed to protect its eligibility as a WSR until a suitability determination is made in this RMP. The Delaware River would be managed with various prescriptions, such as classifying certain segments of the river under VRM Class II and IV, closing areas adjacent to the river to renewables and mineral development), and proposing the area as a ROW avoidance area. Adverse impacts to riparian and wetland vegetation would be minimized within these areas.

Impacts from Alternative A

Under Alternative A, the Black River would be recommended as suitable for inclusion in the NWSRS and would be managed with the following prescriptions: VRM Class II, travel limited to designated routes, closed to leasable and salable mineral development, withdrawn from locatable mineral development, and excluded from both ROW development and renewable energy projects.

Also, under this alternative the Delaware River (one segment comprising 8.22 miles) would be recommended as suitable for designation in the NWSRS and would be managed under same prescriptions above for the Black River. All of these prescriptions would minimize surface disturbance and therefore reduce adverse impacts to riparian and wetland vegetation.

Compared with the No Action Alternative, which does not designate either the Black or the Delaware River in the NWSRS, the magnitude of adverse impacts to riparian and wetland vegetation would be smaller under this alternative.

Impacts from Alternatives B and C

Under both of these alternatives, proposed management concerning the Black River would be the same as under Alternative A, resulting in minimized surface disturbance and potential adverse impacts to soil and water resources. The Delaware River (Segment 1) would not be recommended as suitable for inclusion in the NWSRS and would be managed with prescriptions, including designation as VRM Class III, OHV limited, and various portions open to leasable mineral development with standard lease terms and conditions (1.0 miles) and open with major constrains (7.5 miles). Locatable and salable mineral development would be open in some areas but closed or recommended for withdrawal in others.

Compared with the No Action Alternative, which does not designate the Black River in the NWSRS and would keep the Delaware River open to locatable mineral development, the magnitude of adverse impacts to riparian and wetland vegetation would be smaller under these alternatives.

Impacts from Alternative D

Under Alternative D, management prescriptions in relation to the Black River would be the same as those under Alternatives A, B, and C, with the exception of the allowance of leasable development open with major constraints on WSR areas. Proposed management of the Delaware River segment would be the same as under Alternatives B and C.

Compared with the No Action Alternative, which does not designate the Black River in the NWSRS and would keep the Delaware River open to locatable mineral development, the magnitude of adverse impacts to riparian and wetland vegetation would be smaller under this alternative.

Impacts of Lands with Wilderness Characteristics Actions on Riparian and Wetland Vegetation

Those riparian and wetland vegetation located within lands with wilderness characteristics would receive beneficial impacts as a result of additional management prescriptions aimed at further minimizing surface disturbances. The greater the number of acres included as lands with wilderness characteristics, the greater the benefit to riparian and wetland vegetation.

The acreages designated as lands with wilderness characteristics vary by alternative and are represented in Table 4-38.

Table 4-38. Acres within Lands with Wilderness Characteristics by Alternative

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
NA*	66,666	47,611	5,119	1,221

* There would be no units managed as lands with wilderness characteristics under the No Action Alternative.

Impacts from Management Common to All Action Alternatives

Riparian and wetland vegetation occurring on lands with wilderness characteristics would receive indirect positive impacts as a result of applicable management prescriptions, including closure to future leasing or NSO stipulations; closed to salable and withdrawn from locatable mineral development; restrictions on the construction of new roads, structures, and facilities not related to the preservation and enhancement of wilderness characteristics; VRM Class II designation; and vehicular use OHV limited. As a result of these management prescriptions, adverse impacts to riparian and wetland vegetation, such as increased erosional runoff and sediment loading downslope, decreased water quality and movement away from PFC and alterations to stream hydrology and plant communities, would be minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, riparian and wetland vegetation would not receive any beneficial impacts because no lands would be designated under lands with wilderness characteristics, and therefore no riparian and wetland vegetation would benefit from management prescriptions, as described above, specific to designated lands with wilderness characteristics.

Impacts from Alternative A

Under Alternative A, the BLM would designate approximately 66,666 acres for management under lands with wilderness characteristics. Associated management prescriptions would benefit riparian and wetland vegetation by closing all lands with wilderness characteristics acres to future leases, withdrawing all acres from locatable and salable mineral development, excluding ROWs, and limiting travel to existing routes. Beneficial impacts resulting from these management prescriptions would be as those described above.

Compared with the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to riparian and wetland vegetation is much greater under Alternative A.

Impacts from Alternative B

Under Alternative B, the BLM would designate approximately 47,611 acres for management under lands with wilderness characteristics.

Compared with the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to riparian and wetland vegetation is much greater under Alternative B.

Impacts from Alternative C

Under Alternative C, the BLM would designate approximately 5,119 acres for management under lands with wilderness characteristics.

Compared with the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to riparian and wetland vegetation is slightly greater under Alternative C.

Impacts from Alternative D

Under Alternative D, the BLM would designate approximately 1,221 acres for management under lands with wilderness characteristics.

Compared with the No Action Alternative, which designates no lands with wilderness characteristics and does not propose any new management prescriptions, the magnitude of beneficial impacts to riparian and wetland vegetation is slightly greater under Alternative D.

Impacts of Visual Resources Management Actions on Riparian and Wetland Resources

VRM class designations have specific management objectives that, depending on the class designated, could beneficially impact riparian and wetland vegetation. The objectives defined for VRM Class I and II include the preservation or retention of the existing character of the landscape, and they therefore minimize and at times prohibit surface-disturbing activities. Those impacts to riparian and wetland vegetation associated with mineral development, ROW construction and maintenance and other land use authorizations, and road and trail construction would be minimized within these VRM Class I and II designations. The number of acres designated as VRM Class I and II vary across the alternatives and is depicted below in Table 4-39.

Table 4-39. Visual Resource Management Decisions (acres) by Alternative

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***50,671***	***273,709***	***357,803***	***67,963***	***48,263***

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 50,671 acres would be designated under either VRM Class I or II (see Table 4-39). Riparian and wetland vegetation would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres. Various potential adverse impacts associated with ground-disturbing activities include habitat alteration, increased erosional runoff and sediment loading downslope, water quality alterations and movement away from PFC, and changes in plant community composition.

Impacts from Alternative A

Under Alternative A, a total of 273,709 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as under the No Action Alternative; however, the magnitude of beneficial impact would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designation.

Impacts from Alternative B

Under Alternative B, a total of 375,803 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as under the No Action Alternative; however, the magnitude of beneficial impact would be much greater under this alternative because there is a substantially greater number of acres under the VRM Class I and II designation.

Impacts from Alternative C

Under Alternative C, a total of 67,963 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be slightly greater under this alternative because there is an increase in the number of acres under the VRM Class I and II designation.

Impacts from Alternative D

Under Alternative D, a total of 48,263 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as under the No Action Alternative; however, the magnitude of beneficial impact would be smaller under this alternative because there is a decrease in the number of acres under the VRM Class I and II designation.

Impacts of Renewable Energy on Riparian and Wetland Vegetation

Adverse impacts to riparian and wetland vegetation would potentially occur in those areas where renewable energy projects that include surface-disturbing activities are allowed. Solar projects would result in direct removal of vegetation created by solar panels. This would potentially have indirect adverse impacts, such as increased erosional runoff, sediment loading, and degradation of water quality, within these riparian and wetland systems. Additionally, some solar projects would require substantial water resources, which would impact water availability for other resources, as well as potentially reducing water availability. Desert aquifers, springs, seeps, and other water bodies would be adversely impacted as water is extracted to meet the needs of cooling and cleaning solar systems. Wind energy, comprising the placement of wind turbines, would also result in surface disturbances that could adversely impact riparian and wetland vegetation. Impacts associated with surface-disturbing activities would include direct soil compaction and erosional runoff sediment loading, potential contaminant delivery to water bodies, and changes in plant community composition.

Impacts from Management Common to All

Adoption of programmatic policies and BMPs in both the Solar Energy Development Programmatic EIS ROD (BLM 2012a) and decisions from the Final Wind Energy Development Programmatic EIS (BLM 2005) when implemented would potentially minimize adverse impacts to riparian and wetland vegetation across the planning area.

Impacts from Management Common to All Action Alternatives

All action alternatives encourage the placement of wind development projects in areas where transmission corridors are already located and where transmission systems are already in place.

As a result, indirect impacts to riparian and wetland vegetation, such as those described at the beginning of this section, would be greatly minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, the BLM would close or exclude 1,819,929 acres from each geothermal and solar development projects and 7,056 acres from wind development projects. Restrictions on the location of solar or wind energy sites would continue to be implemented on specific sites across the planning area, with the majority of the planning area excluded for solar development, as identified by the Solar Energy Development Programmatic EIS ROD (BLM 2012a). Those sites restricted from wind development projects include WSAs, WSRs, VRM Class I and II areas, and areas with known karst occurrences (for complete list of restrictions, see Chapter 2, Alternatives Matrix). Wind energy development would be restricted in designated SMAs to protect sensitive soils. In addition, applications to permit either solar or wind energy sites on public land within the planning area would be considered only if the applicant can demonstrate no negative impacts on avian and bat species. All of these management decisions would benefit riparian and wetland vegetation by minimizing surface disturbance and its associated adverse impacts, as those described above.

Impacts from Alternative A

Under Alternative A, the BLM would exclude approximately 666,783 acres from wind development. Approximately 768,020 acres would be excluded from solar development and 995,285 acres would be closed to geothermal development. Solar, wind, and geothermal development would be excluded in areas with sensitive soils, not only in SMAs, as is the case under the No Action Alternative.

Compared with the No Action Alternative, the magnitude of beneficial impacts to riparian and wetland vegetation would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative. Though the No Action Alternative prohibits solar development projects on a larger number of acres, the Solar Energy Development Programmatic EIS ROD (BLM 2012a) states that most of the planning area would not be suitable to support solar development, which makes the greater number of acres closed to solar development irrelevant.

Impacts from Alternative B

Under Alternative B, the BLM would exclude approximately 912,860 acres from wind development. Under this alternative, 833,305 acres would be excluded from solar and 1,372,791 acres would be closed to geothermal development. Solar, wind, and geothermal development would be excluded in all areas with sensitive soils.

Compared with the No Action Alternative, the magnitude of beneficial impacts to riparian and wetland vegetation would be potentially greater because all sensitive soils would be protected, and wind development would be prohibited on a substantially larger number of acres under this alternative.

Impacts from Alternatives C and D

Under Alternative C, the BLM would exclude approximately 206,184 acres from wind development. Approximately 734,636 acres would be excluded from solar and 608,850 acres would be closed to geothermal development. Under Alternative D, 73,143 acres would be excluded from wind development. Under Alternative D, 630,302 acres would be excluded from solar and 464,187 acres would be closed to geothermal development. Wind and geothermal development would be avoided in areas with sensitive soils, while solar development would be excluded.

Compared to the No Action Alternative, the magnitude of beneficial impacts to riparian and wetland vegetation would be potentially greater because all sensitive soils would be avoided, and wind development would be prohibited on a substantially larger number of acres under this alternative.

4.2.4 Fish and Wildlife

4.2.4.1 Fish

This section presents an analysis of the impacts of management actions addressed in Chapter 2 on non-special status fish in the planning area. Existing conditions concerning fish across the planning area are described in Chapter 3. The fish species analyzed in this section are described in detail in Section 3.2.5.1 and include information on both game and non-game fish distributions across the planning area. Habitat locations for fish species consist of CFO lakes, rivers, and streams, as shown on Map 3-1. Impacts on special status fish and wildlife species are discussed in Section 4.2.5.1.2.

4.2.4.1.1 Analysis Methods

Indicators

In general, all protective measures that limit water pumping and ground-disturbing activities, particularly those associated with oil and gas development, would minimize adverse impacts on fish and other aquatic species.

Indicators used to assess impacts between alternatives in this analysis are the following:

- Acres of riparian habitat directly impacted.

Methods and Assumptions

Impacts to fish from management actions of the following resources, resources uses, and special designations are analyzed in detail: minerals, land use authorizations, livestock grazing, recreation, travel management, VRM and special designations. Impacts from proposed management actions for air quality, water resources,

riparian, vegetative communities, fish and wildlife, special status species, wildland fire and fuels management, karst resources, lands with wilderness characteristics, paleontological and cultural resources actions are not analyzed in detail because the management actions did not vary measurably between alternatives and/or there are no or negligible impacts to fish as a result of those management actions.

The assumptions used for the impact analysis include the following:

- Those proposed management actions across the planning area that limit ground-disturbing activities would minimize resulting habitat degradation for fish and other aquatic species because impacts associated with ground disturbance, such as increased sedimentation and turbidity, alterations in water quality and loss of streamside vegetation, would not occur.
- Where special status aquatic species and native non-game fish coexist, management actions that would reduce or improve overall habitat quality would also reduce or improve overall habitat quality for native non-game fish.
- The health of fish and other aquatic wildlife populations is directly related to overall health and functional capabilities of aquatic, riparian, and wetland resources. Those proposed actions that would benefit riparian and other aquatic habitats, such as managing water pumping activities, prohibiting livestock grazing and other surface-disturbing activities, and contribute to meeting PFC would also indirectly benefit fish species by maintaining water quantity, quality, and limiting sedimentation and turbidity impacts that can negatively affect aquatic species and the habitats they depend on.

4.2.4.1.2 Direct and Indirect Impacts

Any actions that remove degrade, or fragment fish habitats are considered adverse. Beneficial impacts include actions that conserve or improve aquatic habitats, including surrounding vegetation. Proper management of soil, water, and vegetative resources, particularly in the riparian zones of watersheds, would reduce disturbances to habitat and would result in beneficial impacts to fish. Direct impacts to fish could result from the loss of habitats or key habitat features, such as spawning or feeding areas, or from the immediate loss of life.

Disturbance impacts range from short-term displacement and shifts in activities to long-term abandonment. For the purpose of this analysis, short-term impacts to fish species result from activities that contribute to the decline in abundance or distribution of a species within 5 years after the activity.

The following impacts would have the potential to affect the survivability and fecundity of fish species and are considered for this analysis:

- Sediment and turbidity—Sediment loading, resulting from increased erosion, and turbidity in waters containing sediment-intolerant fish species can reduce the availability of suitable spawning and rearing habitats, impair sources of food for fish, contribute to loss of recruitment and, in some cases, cause direct physical harm and stress.
- Habitat alteration—Changes in water quantity (instream flow) and habitat that make it nonfunctional for select species or more conducive to competitive species.
- Loss or reduction of streamside vegetation/cover—Increased temperatures, stress, reduced productivity, and disruptions to food resources.
- Water quality alteration—Actions that alter important water quality parameters, including pH, dissolved oxygen, temperature, hardness, alkalinity/salinity, and turbidity.

Impacts of Livestock Grazing Actions on Fish

The removal of livestock from riparian habitats would provide beneficial impacts to fish resources, as erosion, sedimentation, trampling of vegetation, and degradation of water quality—all of which are associated with livestock grazing (Belsky et al. 1999)—would be minimized. Fish would benefit from greater protection of these important habitat components.

Specific riparian areas may be open or closed to livestock grazing, depending on the alternative. Table 4-40 below depicts areas associated with particular river systems across the planning area and livestock grazing management actions across the alternatives.

Table 4-40. Riparian Area Management Decisions by Alternative

Riparian/River Areas	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Pecos River	Open to grazing with exception of the RNAs of the Pecos River Canyons, bluntnose shiner habitat, and Red Bluff Area	Number of livestock and season of use to be established on allotment basis to ensure adequate growing season rest	Same as Alternative A	Same as Alternative A	Same as Alternative A
Black River Management Area	Closed to grazing	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Small portion along Black River (outside of Black River Management Area)	Open to livestock grazing	Removal of livestock grazing within 656 feet of the river bank on either side	Same as Alternative A	Same as No Action Alternative	Same as No Action Alternative
Delaware River (both sides of U.S. 285)	Livestock grazing not permitted from November to March	Same as No Action Alternative	Removal of livestock grazing from seasonal pastures	Removal of livestock grazing from all riparian pastures	Same as No Action Alternative
Riparian springs	The following springs would be closed to grazing: Bogle Flat, Preservation, Cottonwood, Owl, Ben Slaughter, and Blue Spring	Riparian Springs and their associated riparian zones would be closed to grazing.	Same as Alternative A	Same as Alternative A	Same as Alternative A

Impacts from Management Common to All

Under all alternatives, the Black River Management Area would be closed to grazing. This proposed decision would beneficially impact fish resources through minimizing the loss of streamside vegetation cover and minimizing changes in water quality within the Black River Management Area that can result from livestock grazing.

Impacts from the No Action Alternative

Under the No Action Alternative, current livestock grazing management prescriptions would remain in place and include keeping 5,000 acres of unallotted tracts open to livestock grazing. This alternative would also close 5,226 acres to livestock grazing. Adverse impacts to fish, resulting from increased erosion, sedimentation, water depletion, and loss of streamside vegetative cover, would be minimized through greater water quality protection within these sensitive riparian habitats and fragile watersheds (see Direct and Indirect Impacts section above for further discussion on how these components impact fish).

Impacts from Alternative A

Under Alternative A, 493,120 acres would be closed to livestock grazing. This includes 5,000 acres of unallotted tracts would be closed to grazing for the purpose of protecting wildlife vegetation and watershed health. Adverse impacts to fish resources as under Alternative A would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts from Alternative B

Under Alternative B, 153,583 acres would be closed to livestock grazing, which includes 5,000 acres of unallotted tracts. Adverse impacts to fish resources as under Alternative B would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts from Alternative C

Under Alternative C, 8,115 acres would be closed to livestock. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Adverse impacts to fish resources as under Alternative C would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts from Alternative D

Under Alternative D, 3,594 acres would be closed to livestock grazing. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Adverse impacts to fish resources as under Alternative D would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts of Recreation Actions on Fish

Recreation management can impact aquatic species and their habitats in many ways. Human activity along or within streams and rivers, and around or within ponds, lakes, and reservoirs can, result in habitat alteration, reduced or loss of riparian vegetation cover, increased sedimentation and turbidity, and water contamination.

Acreages across the planning area designated as SRMAs or as ERMAs would not directly or indirectly impact fish resources. Recreational use of these areas would not be expected to increase or decrease as a result of designation and would not, therefore, affect vegetation cover around water bodies, sedimentation, turbidity, or overall water quality. Proposed management actions associated with mineral development and visual resources management on RMAs, however, would potentially affect fish resources and is addressed specifically within the mineral development and visual resources sections below.

Impacts from Management Common to All

RAMPs would be prepared for all designated SRMAs under management common to all. The purpose of SRMAs is to focus management, better direct people to opportunities, and coordinate recreation activities with other multiple uses in the area. The RAMPs that would be prepared for the designated SRMAs identify specific recreation implementation actions, including permitting or use allocation decisions. As part of a RAMP preparation, other resources and resource use issues are considered, which generally provides for mitigation of impacts due to recreation activities proposed under SRMAs. Therefore, it is unlikely that there would be any adverse impacts from the development of RAMPs to fish.

Under management common to all, all activities would adhere to BLM New Mexico supplementary rules that provide for several safety and procedural parameters for activities on public lands, such as no construction of pit toilets lasting more than 14 days within 100 feet of any permanent water source, no fireworks, and no cutting or removal of woody materials. All of these rules would reduce or prevent adverse impacts to fish from water contamination and sediment loading.

In addition, the Pecos River Corridor (5,619 acres) SRMA would be closed to all surface-disturbing activities, which would minimize adverse impacts such as those described above.

Impacts from Management Common to All Action Alternatives

All action alternatives in the planning area would maintain water quality in natural water sources by prohibiting camping within 900 feet of these areas (excluding the Pecos River). This would benefit native fish by reducing disturbance near riparian areas, maintaining or improving water quality, reducing sedimentation, and contributing to the overall health of riparian ecosystems near recreational areas. Other proposed decisions under management common to all action alternatives would have no effect on fish species.

Impacts of Travel Management Actions on Fish

Travel management may adversely impact fish in various ways. The presence of trails and roads within watersheds containing fish and other aquatic species can cause habitat alteration, loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, and water quality alteration. Roads and trails provide means of water conveyance, which accelerates flow velocities and increases erosion and offsite soil movement and ultimately sedimentation and turbidity. These routes also compact soils, which reduce water absorption and infiltration rates and increase the peaks of runoff flows. Where motorized and, in some cases, mechanized use are high and or increasing, erosion potential is increased. These impacts are amplified where OHV use is occurring or increasing. However, the direct and indirect impacts from OHV limited travel would be minor within the planning area because OHV-caused surface disturbances would be confined to existing trails and routes.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, roads would be constructed and maintained as per the BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development – The Gold Book* (BLM 2007a). Additionally, all surfacing material on oil and gas roads must be removed at the time of abandonment. Both of these management actions would impart indirect beneficial impacts to fish resources by minimizing the potential for erosion, runoff and contamination of streams, rivers and other water bodies that provide habitat for fish.

Impacts from the No Action Alternative

Under the No Action Alternative, 2,035,307 acres would be managed as OHV limited and approximately 55,966 acres would be closed to travel. In general, as route density increases, adverse impacts to riparian and other aquatic habitats potentially increases as well. With the majority of the planning area designated as OHV limited use under this alternative, fish resources, and habitat components upon which they depend, would be affected to a minor adverse degree because OHV travel would be confined to existing routes. The minor impacts would include those discussed above: soil erosion, sedimentation, runoff, and the potential for stream and river contamination.

Impacts from Alternative A

Under Alternative A, approximately 2,039,299 acres would be managed as OHV limited and 52,028 acres would be closed to travel. Compared to the No Action Alternative, the magnitude of impact would be slightly greater because of a 0.2% decrease in the number of acres closed to travel.

Impacts from Alternative B

Under Alternative B, approximately 2,039,299 acres would be managed as OHV limited and 41,936 acres would be closed to travel. Compared to the No Action Alternative, the magnitude of impact would be slightly greater because of a 0.7% decrease in the number of acres closed to travel.

Impacts from Alternatives C and D

Under these action alternatives, approximately 2,052,582 acres would be managed as OHV limited and 38,738 acres would be closed to travel under Alternative C, and approximately 2,052,584 acres would be managed as OHV limited and 38,737 would be managed as closed under Alternative D. Compared to the No Action Alternative, the magnitude of impact would be greater from either Alternative C or Alternative D because of a 0.8% decrease in the number of acres closed to travel.

Impacts of Land Use Authorizations Actions on Fish

The authorization of ROWs for utility and communication infrastructure (among others) could have direct, long-term, adverse impacts on fish resources as a result of fragmentation and erosion during construction and maintenance activities. These actions could contribute to an increase in sedimentation and turbidity and reduce overall riparian habitat condition and water quality. Management decisions to avoid or exclude certain areas from ROWs would have beneficial impacts to fish resources (Table 4-41).

Table 4-41. Avoidance and Exclusion Areas for Land Use Authorizations (acres) by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoidance	30,965	629,149	413,654	313,619	270,360
Exclusion	7,056	662,038	918,701	165,378	69,540

Impacts from the No Action Alternative

Under the No Action Alternative, six ROW corridors have already been designated by the BLM as preferred locations for all new major utility and transportation facility alignments. A total of 30,965 acres would continue to be designated as avoidance areas and 7,056 acres (all WSAs) would continue to be designated as exclusion areas. These designations would benefit fish resources by minimizing ROW construction and associated fragmentation and disturbance near or within these important habitat areas.

Impacts from Alternative A

Under Alternative A, 629,149 acres would be designated as avoidance areas and 918,701 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative A would have fewer adverse impacts to fish resources through protection of important habitat components.

Impacts from Alternative B

Under Alternative B, 413,654 acres would be designated as avoidance areas and 704,445 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative B would provide fewer adverse impacts to fish resources through protection of important habitat components.

Impacts from Alternative C

Under Alternative C, 313,619 acres would be designated as avoidance areas and 165,378 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative C would provide fewer adverse impacts to fish resources through protection of important habitat components.

Impacts from Alternative D

Under Alternative D, 270,360 acres would be designated as avoidance areas and 69,540 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative D would provide fewer adverse impacts to fish resources through protection of important habitat components.

Impacts of Mineral Resource Actions on Fish

The majority of the planning area would be available for leasable, salable, and locatable mineral development. Mineral development activities would be subject to site-specific NEPA analysis, stipulations, COAs, and other authorities as described in Chapter 3, Section 3.3.1. In general, surface disturbance related to mineral extraction could reduce water quality and riparian condition (PFC), causing both short- and long-term impacts to native fish. Other impacts from minerals development could potentially include water depletions and increased sedimentation and turbidity.

Of primary concern are activities that result in ground disturbance and the removal of native vegetation for the construction of well pads, roads, pipelines, compressor and relay stations, settling ponds, and various assorted infrastructure. Collectively, all of these activities have the potential to provide for the off-site movement of soils and increase sediment loading and turbidity into nearby water bodies. In addition, they provide opportunities for invasive vegetation and noxious, non-native species to take hold. This reduces watershed health and results in poor soil retention, increased runoff, and poor water infiltration and absorption.

An increase in the numbers and densities of roads would be a concern because they are long-term chronic point sources of sediment input, contamination from vehicles, and serve as water collection and conveyance corridors to live streams and ephemeral drainages that ultimately feed live streams. Impacts are amplified and more acute in areas where natural gas development is occurring in small discrete

watersheds. Generally, where proper and timely reclamation is occurring at well pad and pipeline sites, and where proper road construction and maintenance is occurring, impacts from off-site soil movement and sediment and turbidity would be minimized.

The acreage of land open to minerals extraction (for leasable, salable, and locatable minerals) varies across the action alternatives and is discussed below. Since leasable mineral development is the most common and prolific type of mineral development in the planning area, acres of BLM-administered lands subject to leasable mineral decisions are used to define impacts to fish in this section.

Impacts from the No Action Alternative

The greater the numbers of acres open to mineral development, the greater the potential for impacts to fish resources, as watershed health and overall riparian condition would become more vulnerable to degradation. Under the No Action Alternative, 1, 598,870 BLM surface acres would be open to leasable mineral development with standard terms and conditions. A combined 1,011,012 acres would be open with either moderate constraints (CSU) or major constraints (NSO). These lands would have greater protection from surface disturbance than those lands open under standard terms and conditions. Approximately 174,391 acres would be closed to leasable mineral development.

Impacts from Alternative A

Alternative A would open 1,142,802 surface acres within the planning area to leasable mineral development with standard terms and conditions, while a combined 880,043 surface acres would be managed as CSU or NSO. Approximately 761,404 surface acres would be closed to leasable mineral development. Alternative A provides less open areas to leasable mineral development than the No Action Alternative. Additionally, more acres would be closed to leasable mineral development than the No Action Alternative; thereby reducing the amount of surface disturbance, which would reduce sedimentation, potential improve water quality, and reduce indirect impacts to riparian areas.

Impacts from Alternative B

Alternative B would open 1,089,481 surface acres within the planning area to leasable mineral development, while a combined 614,772 acres would be managed as CSU or NSO. Approximately 1,082,972 surface acres would be closed to leasable mineral development. Alternative B provides less open areas to leasable mineral development than the No Action Alternative. Additionally, more acres would be closed to leasable mineral development than the No Action Alternative; thereby reducing the amount of surface disturbance, which would reduce sedimentation, potential improve water quality, and reduce indirect impacts to riparian areas.

Impacts from Alternative C

Alternative C would open 1,750,774 surface acres within the planning area to leasable mineral development, while a combined 944,782 surface acres would be managed as CSU or NSO. Approximately 88,502 surface acres would be closed to leasable mineral development. Alternative C provides more open areas to leasable mineral development than the No Action Alternative. Additionally, fewer acres would be closed to leasable mineral development than the No Action Alternative; thereby increasing the amount of surface disturbance, which would reduce sedimentation, potential improve water quality, and reduce indirect impacts to riparian areas. Alternative C would have a greater adverse impact on soil resources than the No Action Alternative because more acreage would be open to minerals-related surface disturbances.

Impacts from Alternative D

Alternative D would open 1,997,681 surface acres within the planning area to leasable mineral development, while a combined 701,776 surface acres would be managed as CSU or NSO. Approximately 84,687 surface acres would be closed to leasable mineral development. Alternative D provides less more areas to leasable mineral development than the No Action Alternative. Additionally, fewer acres would be closed to leasable mineral development than the No Action Alternative; thereby increasing the amount of adverse surface disturbance, which would potentially increase sedimentation, degrade water quality, and increase indirect impacts to riparian areas (the same as Alternative C).

Impacts of Special Designation Actions on Fish

Special designation areas, such as ACECs, WSRs, and WSAs would generally have long-term positive impacts on fish resources that occur within their boundaries by limiting or preventing ground disturbance, human activities, and associated habitat degradation and fragmentation. Management goals within special designations would include the protection of relevant and important fish resources and natural systems. These additional protections to riparian ecosystems and other water bodies would benefit native fish, as water quality and other food and habitat components are enhanced. Adverse impacts to fish resources, such as habitat and water quality alterations, reduction in streamside vegetation, and excessive sedimentation and turbidity within these designations would be minimized.

Areas of Critical Environmental Concern

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 13,435 acres would continue to be designated as ACECs. Adverse impacts, as those described above, to fish resources and associated habitat components would be minimized within this acreage.

Impacts from Alternative A

Under Alternative A, 495,042 acres would be designated as ACECs. This alternative would have the same beneficial impacts as under the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the substantial increase in the land designated as ACECs.

Impacts from Alternative B

Under Alternative B, 561,441 acres would be designated as ACECs. This alternative would have the same beneficial impacts as under the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the substantial increase in the land designated as ACECs.

Impacts from Alternative C

Under Alternative C, 98,562 acres would be designated as ACECs. This alternative would have the same beneficial impacts as under the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the increase in land designated as ACECs.

Impacts from Alternative D

Under Alternative D, 28,894 acres would be designated as ACECs. This alternative would have the same beneficial impacts as under the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the increase in land designated as ACECs.

Wild and Scenic Rivers

Impacts from Management Common to All Action Alternatives

Under all action alternatives, 3.7 miles the Black River would be recommended as suitable for inclusion in the NWSRS. Management prescriptions for Black River WSR would vary across alternatives and are described below. Management prescriptions associated with the designated WSR segment would beneficially impact fish resources because potential adverse impacts, such as increased sedimentation and turbidity, decreased stream vegetation, and water quality alterations, would be minimized.

Impacts from the No Action Alternative

Under the No Action Alternative, the Black and Delaware Rivers would not be managed as part of NWSRS but would be managed to protect their eligibility until suitability determinations are made in this RMP. Both eligible river segments would be managed as NSO for leasable minerals, closed to salables, recommended for withdrawal for locatables, closed or excluded to renewables, and managed as a ROW avoidance areas. The Black River would be managed as VRM Class III, whereas the Delaware River would be managed as

VRM Class II and IV. These prescriptions would reduce surface disturbance, thereby reducing potential adverse impacts to fish resources including habitat and water quality alterations, reduction in streamside vegetation, and excessive sedimentation and turbidity.

Impacts from Alternative A

Under Alternative A, one segment (8.22 miles) of the Delaware River would be recommended as suitable for WSR designation. Management prescriptions under WSR designation would include manage as VRM Class II, travel limited to designed routes, closed or withdrawn from mineral development, and excluded from ROW corridors and renewable energy development. The Black River WSR would be managed with the same prescriptions. These management prescriptions provide a slightly greater degree of protection to fish resources compared to the No Action Alternative because the rivers would be exclusion areas rather than avoidance areas and would be managed as VRM Class II in their entirety

Impacts from Alternative B

Under Alternative B, the Black River would be recommended as suitable for inclusion in the NWSRS and would be managed as described under Alternative A. The Delaware River would not be recommended as suitable for inclusion in the NWSRS; however, management prescriptions would be more protective of riparian habitat than as described under the No Action Alternative. Adverse impacts to fish resources would be less than those described under the No Action Alternative.

Impacts from Alternative C

Under Alternative C, the Black River would be recommended as suitable for inclusion in the NWSRS and would be managed as described under Alternative A. The Delaware River would not be recommended as suitable for inclusion in the NWSRS and would be managed as described under Alternative B. Adverse impacts to fish resources would be less than those described under the No Action Alternative.

Impacts from Alternative D

Under Alternative D, the Black River would be recommended as suitable for inclusion in the NWSRS and would be managed as described under Alternative A, except the area would be managed as open with major constraints (NSO) for leasable development. The Delaware River would not be recommended as suitable for inclusion in the NWSRS and would be managed as described under Alternative B. Adverse impacts to fish resources would be less than those described under the No Action Alternative.

Wilderness Study Areas

Impacts from Management Common to All

Under all of the alternatives, 7,086 acres would remain under WSA designation. Management prescriptions under WSA designation include closure to mineral development leasing. This would minimize potential adverse impacts to fish resources associated with ground disturbances, such as increased sedimentation and erosion, increased turbidity, alterations in habitat and water quality, and water depletions.

Impacts of Visual Resources Management Actions on Fish

VRM class designations have specific management objectives that, depending on the class designated, could beneficially impact fish resources. The objectives defined for VRM Class I and II include the preservation or retention of the existing character of the landscape and, therefore, minimize and at times prohibit surface-disturbing activities. Those impacts to fish resources associated with mineral development, ROW construction and maintenance and other land use authorizations and road and trail construction would be minimized within these VRM Class I and II designations. The number of acres designated as VRM Class I and II vary across the alternatives and is depicted below (Table 4-42).

Table 4-42. Visual Resource Management Decisions (acres) by Alternative

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***50,671***	***273,710***	***357,802***	***67,962***	***48,263***

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 50,671 acres would be designated under either VRM Class I or II (see Table 4-42). Fish resources would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres. Various impacts associated with ground-disturbing activities include habitat alteration, loss or reduction in streamside vegetation cover, water quality alteration, water depletions, and increased sediment loading and turbidity.

Impacts from Alternative A

Under Alternative A, a total of 273,710 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be much greater under this alternative because there are a greater number of acres under the VRM Class I and II designation.

Impacts from Alternative B

Under Alternative B, a total of 357,802 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative because there are a greater number of acres under the VRM Class I and II designation.

Impacts from Alternative C

Under Alternative C, a total of 67,962 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative because there would be an increase in the number of acres under the VRM Class I and II designation.

Impacts from Alternative D

Under Alternative D, a total of 48,263 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, there would be more adverse impacts under this alternative because there would be a decrease in the number of acres under the VRM Class I and II designation when compared to the No Action Alternative.

4.2.4.2 Wildlife

This section discusses impacts to wildlife from management decisions for resources and resource uses discussed in Chapter 2. Existing conditions and trends concerning wildlife and the ecosystems on which they depend are described in Section 3.2.5. Impacts to resources and resource uses resulting from implementation of wildlife management actions, including habitat improvement projects and restrictions placed on development around sensitive wildlife habitat features (e.g., bat roosts, heronries), are discussed in those particular resource sections of this chapter.

Actions that remove, degrade, or fragment wildlife habitats are considered to result in adverse impacts. Beneficial impacts include impacts from actions that conserve or improve habitats, and those that mitigate for and/or avoid adverse impacts.

Activities on public lands that could result in adverse impacts to wildlife (including insect pollinators) and fisheries include, but are not limited to:

- Direct or indirect harm, harassment, or loss of an individual animal regardless of how long the impact may occur;
- Human activities, such as OHV use, recreation, and noise from equipment associated with development and surface-disturbing activities;
- Loss of habitats or key habitat features, such as a nest site or lek area;
- Habitat fragmentation by activities such as vegetation treatments, fire management, mineral exploration and extraction, construction and maintenance of roads and trails, and development of wind-energy facilities;
- Toxic contamination of wildlife or the loss of habitat for populations to reestablish caused by toxic material either on the surface or belowground;
- Short- or long-term loss or degradation of wildlife abundance and/or diversity from impacts to wildlife habitat;
- Loss or degradation of wildlife habitat from introduction of invasive, non-native, or exotic flora or fauna.

Disturbance impacts range from short-term displacement and shifts in activities to long-term abandonment of home range (Connelly et al. 2000; Miller et al. 1998; Yarmaloy et al. 1988). Many human activities are considered to be particularly detrimental to nesting and lekking LPCs, nesting raptors, and wintering big game. Disturbance during sensitive periods (e.g., winter, nesting) is known to adversely impact wildlife by causing increased energy expenditure during times when the energy input/output balance is already tenuous (Boyle and Samson 1985; Knight and Cole 1991). Increased energy expenditure and home range abandonment can result in reduced breeding fitness and/or opportunities, ultimately leading to reduced abundance.

Avoidance is the preferred method to prevent loss or degradation of wildlife and wildlife habitat. If a measure to prevent the loss of habitat is not available, then an action (mitigation) would be designed to minimize impacts to all affected areas, including consideration of off-site mitigation and studies to determine the magnitude of impacts for adaptive resource management techniques, which would adjust management accordingly.

4.2.4.2.1 Analysis Methods

Indicators

The indicators used for the analysis of impacts to wildlife consist of habitat quality, loss or gain of habitat, and wildlife surveys. These indicators are explained in detail in Section 4.2.4.2.2 of this document. Impacts are not analyzed for every indicator in every section of this analysis; only those indicators relevant to the management in each section are used.

Methods and Assumptions

Impacts to wildlife from management actions described in Chapter 2 are analyzed in detail here for the following resources and resource uses: fish and wildlife, riparian areas, special status species, visual resources, air resources, livestock grazing, recreation and travel management, land use authorizations, renewable energy, minerals, and special designations. Impacts from decision related to cave and karst resources, soil resources, vegetative communities, riparian, wildland fire and fuels management, water resources, cultural resources, paleontological resources, land tenure, lands with wilderness characteristics, Outstanding Natural Areas (ONAs), RNAs, SMAs, and backcountry byways are not analyzed in detail. This is because there would be no or negligible impacts to wildlife and wildlife habitat as a result of those management actions because wildlife habitat would not be measurably altered, and individuals would not be impacted. Management actions related to tribal rights and interests, social and economic conditions, and public safety do not authorize, contemplate, or otherwise intersect with surface-disturbing activities or the mitigation thereof, so these decisions also do not impact wildlife or wildlife habitat.

Impacts to wildlife from proposed management actions are analyzed based on the scientific literature, including published studies and government reports. Assumptions used in this impact analysis consist of the following:

- Disturbance impacts to wildlife are evaluated by comparison to current management practices in the planning area; increased protection in time or space is beneficial, whereas reduced protection results in adverse impacts.
- Disturbance during sensitive periods, such as nesting and wintering, adversely impacts wildlife.
- Habitat fragmentation adversely impacts wildlife.
- The amount of surface disturbance due to leasable, salable, and locatable minerals development increases as a function of the acreage open to mineral development. Although that acreage does not quantify the exact amount of surface disturbance related to minerals development, it measures potential wildlife impacts as a result of the surface-disturbing activities associated with mineral development.

4.2.4.2.2 Direct and Indirect Impacts

Impacts of Fish and Wildlife Management Actions on Wildlife

Impacts from the No Action Alternative and Alternatives C and D

Under the No Action Alternative and Alternatives C and D, there would be no specific action to manage the proposed Birds of Prey Grassland ACEC as an ACEC. As such, the area would remain open to wind and solar energy development, as well as OHV limited use and grazing. Mineral leasing would continue to be associated with standard terms and regulations. As a result, the potential for mortality of individuals, habitat degradation, and removal of grassland wildlife species associated with these activities would not change from the current conditions.

Impacts from Alternatives A and B

Under Alternatives A and B, 349,355 acres of grasslands would be designated as the Birds of Prey Grassland ACEC. Within the ACEC, development would adhere to prescriptions and stipulations, consisting of OHV limited travel, placing a cap on the amount of area that can be disturbed in a lease, requiring bird nest surveys, restricting the routing of new pipelines and power lines, and locating wells in already disturbed areas. Grazing would be closed under Alternative A but would continue to be allowed in the ACEC under Alternative B. The proposed ACEC prescriptions and restrictions would benefit wildlife that occur in the Birds of Prey Grassland ACEC by reducing allowable amounts of habitat degradation, removal, and disturbance from human noise and activity. This management action would provide for greater benefits to grassland wildlife than the No Action Alternative because these restrictions would not apply under the No Action Alternative.

Impacts of Special Status Species Management Actions on Wildlife

Impacts from Management Common to All Alternatives

All action alternatives would define LPC habitat areas and restrict oil and gas activities within these area, as described in Chapter 2. Management actions focusing on the LPC habitat areas are also beneficial for other wildlife species that use the sand shinnery oak habitat within the habitat areas because these management actions are targeted toward maintaining large patches of diverse habitat and reducing disturbance during the breeding season.

Impacts of Visual Resources Management Actions on Wildlife

Impacts on wildlife from lighting requirements would be the same as described for Impacts of Visual Resource Management Actions on Special Status Wildlife, except for statements made about a particular special status species. This is because common terrestrial wildlife would react to proposed management actions in ways similar to special status wildlife.

Impacts from Management Common to All Alternatives

The impacts to wildlife from visual resources decisions are primarily associated with limitations on surface disturbance intended to reduce impacts to areas with high visual resource values. VRM Class I and II designations are the most restrictive of surface-disturbing activities and would therefore be the most beneficial to wildlife and their habitats. In areas designated as VRM Class I or II, surface-disturbing activities are generally prohibited or limited. Table 4-43 shows the proposed VRM classes in acres.

Table 4-43. Visual Resource Management Classes in Acres

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205
Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Total	***2,783,858***	***2,783,514***	***2,783,481***	***2,783,558***	***2,783,585***

Impacts from the No Action Alternative

The No Action Alternative would designate 50,671 acres (or 1.8% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit wildlife in the ways described in Impacts from Management Common to All Alternatives.

Impacts from Alternative A

Alternative A would designate 273,710 acres (or 9.8% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit wildlife in the ways described in Impacts from Management Common to All Alternatives more than the No Action Alternative.

Impacts from Alternative B

Alternative B would designate 357,802 acres (or 12.8% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit wildlife in the ways described in Impacts from Management Common to All Alternatives more than the No Action Alternative. Because of the large area designated as Class I or II, this alternative is the most beneficial for wildlife, compared with all other alternatives.

Impacts from Alternative C

Alternative C would designate 67,962 acres (or 2.4% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit wildlife in the ways described in Impacts from Management Common to All Alternatives more than the No Action Alternative.

Impacts from Alternative D

Alternative D would designate 48,263 acres (or 1.7% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit wildlife in the ways described in Impacts from Management Common to All Alternatives less than the No Action Alternative.

Impacts of Air Resources Management Actions on Wildlife

No impacts to wildlife have been identified from any air resources management actions.

Impacts of Livestock Grazing Actions on Wildlife

Impacts from Management Common to All Alternatives

Under all alternatives, livestock grazing would continue. Livestock grazing can affect grassland wildlife species through such impacts as trampling wildlife individuals, competing for forage, destruction of pollinator nests and potential nest sites, removal of pollinator food resources, and habitat degradation by the spread of invasive weeds and promoting the spread of mesquite. Cattle disperse honey mesquite (*Prosopis*

glandulosa) seeds far from their source, contributing to an ongoing trend of mesquite encroachment on grasslands habitat (Drewa et al. 2001). Mesquite trees grow in dense stands, outcompeting most other vegetation. Mesquite encroachment reduces the availability of habitat for wildlife that occurs in grasslands. Other detrimental impacts from grazing could include loss of forage diversity, lowering of plant and animal population densities, disruption of some ecosystem functions (such as changes in fire frequency and soil composition), changes to community organization, and changes to the physical characteristics of both terrestrial and aquatic habitats (Fleischner 1994; Chaneton and Lavado 1996; Olff and Ritchie 1998).

Livestock grazing management actions primarily focus on the amount of wildlife habitat open and closed to grazing activities. Table 4-44 displays these decisions by alternative. Generally, acres open to livestock grazing lead to higher potential for the negative impacts described above. Acres closed to grazing are generally beneficial to wildlife because the potential for those negative impacts is avoided.

Table 4-44. Livestock Grazing Management Decisions (acres) by Alternative

Status	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
Closed	5,226	493,120	153,583	8,115	3,594
Total	***2,091,333***	***2,091,318***	***2,091,308***	***2,091,347***	***2,091,353***

Impacts from the No Action Alternative

Under the No Action Alternative, 2,086,107 acres would remain open to livestock grazing, and 5,226 acres would be closed. Livestock grazing would be removed from 13 SMAs to reduce conflicts between sensitive riparian habitats, fragile watersheds, and other multiple-use values. Removing grazing from these sensitive habitat areas would benefit the local wildlife by helping to avoid the negative impacts described in Impacts from Management Common to All Alternatives.

Under the No Action Alternative, the following management actions regarding livestock grazing in riparian areas would occur: livestock would be removed from SMAs that contain riparian areas within their designated boundaries; riparian areas of the Pecos River would be open to grazing, except the RNA of the Pecos Rivers Canyons/Complex ACEC, bluntnose shiner habitat, and the Red Bluff area; the Black River Management Area would be closed, but areas of the Black River outside the management area would be open to grazing; grazing would be allowed during the dormant season (November–March) along the Delaware River; and six riparian springs (Bogle Flat, Preservation, Cottonwood, Owl, Ben Slaughter, and Blue Spring) would be closed. In addition to the impacts listed in Impacts from Management Common to All Alternatives, the presence of cattle can be especially detrimental in riparian areas because cattle tend to congregate in riparian areas for shade and water, leading to trampling and overgrazing of stream banks, soil erosion, and loss of stream bank stability (Belsky et al. 1999). This management action could benefit riparian wildlife by enhancing food quality and availability, increasing thermal and hiding cover, decreasing local soil compaction and erosion, and avoiding the loss of stream bank habitat.

Impacts from Alternative A

Under Alternative A, 493,120 acres of BLM-administered land would be closed to livestock grazing, 25.0% more than under the No Action Alternative. In areas closed to livestock grazing, many wildlife species would benefit directly because competition with livestock for forage would be eliminated. As described in Impacts from Management Common to All Alternatives, the spread of mesquite could slow, resulting in maintaining natural ecological processes in areas closed to grazing. Most of the closure to livestock grazing would be in the Birds of Prey, Gypsum Soils, and Chihuahuan Rivers proposed ACECs.

Alternative A would place restrictions on livestock grazing in riparian areas, such as removing grazing within 656 feet of the Black River bank (outside the management area), allowing grazing only during the dormant season (November–March) adjacent to the Delaware River (like the No Action Alternative), removing livestock from the Riparian Springs and associated riparian zones, and establishing grazing systems to ensure adequate growing and rest seasons adjacent to the Pecos River. This alternative would result in the same types of beneficial impacts described in the No Action Alternative, but in a greater riparian area, thereby increasing the magnitude of the impacts.

Impacts from Alternative B

Under Alternative B, 153,583 acres of BLM-administered land would be closed to livestock grazing, primarily in the proposed Desert Heronries ACEC and Gypsum Soils ACEC. In all closure areas, the absence of livestock grazing would benefit wildlife because vegetation would become available for foraging and for cover for wildlife.

Under Alternative B, management actions removing grazing from the riparian areas would be identical to Alternative A except the Black River Management Area would also be closed to grazing, and livestock grazing on the Delaware River would be removed from seasonal pastures. This alternative would result in the same types of beneficial impacts described in the No Action Alternative, but to a greater degree in riparian areas, thereby increasing the magnitude of the beneficial impacts. Compared to the No Action Alternative, this alternative would be more beneficial for wildlife because more acreage would be closed to livestock grazing.

Impacts from Alternative C

Under Alternative C, 8,115 acres of BLM-administered land would be closed to livestock grazing, which is approximately 4 times more than under the No Action Alternative. All increased vegetation from restoration efforts would be allocated to livestock. All increased forage/cover would be allocated to watershed and wildlife resources, which would benefit wildlife due to increased forage availability.

Under Alternative C management actions regarding grazing in the Black River Management Area and the Black River (outside the management area) would be the same as the No Action Alternative. Actions regarding grazing on the Pecos River and Riparian Springs would be the same as Alternative A, and grazing would be removed from the riparian pastures of the Delaware River, including fencing the south side of the river and providing off-site water to pastures where there was previous access to the river. This alternative would result in the same nature of beneficial impacts described in the No Action Alternative, but in a greater riparian area, thereby increasing the magnitude of the impacts.

Impacts from Alternative D

Under Alternative D, 3,594 acres would be closed to livestock grazing. All increased vegetation from restoration efforts would be allocated to livestock and would not provide increased available forage for wildlife.

Under Alternative D, nearly the entire planning area would be adversely open to livestock grazing, with the exception of Pecos bluntnose shiner habitat and the Pope's Well ACEC. That would leave most riparian areas, important grasslands, karst high occurrence zones, and other special habitat types open to livestock grazing, which may result in the adverse impacts described in Impacts from Management Common to All Alternatives.

Under Alternative D management, actions regarding grazing in the Black River Management Area and the Black River (outside the management area) would be the same as the No Action Alternative. Actions regarding grazing on the Pecos River, Delaware River, and Riparian Springs would be the same as Alternative A. This alternative would result in the same types of beneficial impacts described in the No Action Alternative, but in a greater riparian area, thereby increasing the magnitude of the impacts. Alternative D would be the least beneficial of the action alternatives because the fewest acres would be closed to livestock grazing to protect wildlife habitat.

Impacts of Recreation and Travel Management Actions on Wildlife

Impacts from Management Common to All

Under all alternatives, recreational activities would continue to be permitted in the planning area, with adverse impacts on wildlife species primarily from OHV use. OHVs can adversely impact wildlife through multiple mechanisms that include short-term adverse impacts to air quality from dust production, short- and long-term loss of vegetation cover from damage by vehicles and soil disturbance, mortality by collision, loss and disturbance of nests for ground-nesting avian and pollinator species, habitat fragmentation,

degradation of habitat through introduction of invasive and exotic weed species and associated impacts to habitat quality and quantity of available habitat, and displacement due to human noise and activity. However, these adverse impacts would be mitigated by designating OHVs as limited -l, which would greatly reduce the impacts of vegetation and habitat loss, but all other impacts would potentially occur. The scale of these impacts, however, would only occur adjacent to OHV limited routes. Closure of areas to OHV use would help to prevent these negative impacts on wildlife that inhabit the closed areas, which would be a beneficial impact. Table 4-45 displays the amount of habitat open, limited to designated and existing routes, and closed to OHV use.

Table 4-45. Travel Management Decisions (acres) by Alternative on BLM-administered Lands

Management	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966 (2.7%)	52,028 (2.5%)	41,936 (2.0%)	38,738 (1.9%)	38,737 (1.9%)
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

In addition to OHV use, impacts from recreation can be placed into three categories: potential for fire, equestrian activities, and hunting. Where recreational activities are permitted, there is a risk of unplanned wildfire associated primarily with campfires and cigarette smoking, leading to the adverse impacts of fire. Equestrian recreational activities may promote the spread of invasive and noxious weeds from livestock feed (hay) containing invasive and noxious weed seeds, thus degrading habitat quality by reducing biodiversity and available nutrients for forage. Hunting can adversely affect game species by being a direct source of mortality. Hunting may adversely or beneficially affect non-game species by directly reducing population numbers of prey, competitors, or predators.

Impacts from the No Action Alternative

Under the No Action Alternative, 55,966 acres (2.7% of the planning area) would be closed to OHVs, and approximately 2,035,307 acres would be managed as OHV limited. There would be potentially adverse impacts of OHV use on wildlife (discussed above in Impacts from Management Common to All Alternatives) under this alternative from engine and human-caused noise disturbance, possible mortality by collision, or habitat fragmentation and degradation. However, the impacts would be minor because OHV travel would be confined to trails and routes.

Impacts from Alternative A

Under Alternative A, 52,028 acres (2.5% of the planning area) would be closed to OHVs and 2,039,299 acres (97.5% of the planning area) would be managed as OHV limited. Compared to the No Action Alternative, the magnitude of impact would be slightly greater because of a 0.2% decrease in the number of acres closed to travel. Compared with the No Action Alternative, wildlife populations adjacent to existing or designated routes would potentially be adversely impacted slightly more by fugitive dust, habitat fragmentation, displacement due to human noise and activity, and habitat degradation from the introduction of invasive and exotic weed species; however, the impacts to wildlife from OHV limited use would be minor because OHV travel would be confined to existing routes and trails.

Impacts from Alternative B

Under Alternative B, 41,936 acres (2.0% of the planning area) would be closed to OHVs, and 2,049,391 acres (98% of the planning area) would be OHV limited. Compared to the No Action Alternative, the magnitude of impact would be slightly greater because of a 0.7% decrease in the number of acres closed to travel. The adverse impacts would be minor for the same reasons as discussed under the No Action Alternative for the same reasons.

Impacts from Alternatives C and D

Under Alternatives C, 38,738 acres (1.9% of the planning area) would be closed to OHVs, and 2,052,582 acres (98.1% of the planning area) would be OHV limited, and under Alternative D, approximately 2,052,584 acres would be managed as limited and 38,737 acres would be closed to OHV use. Compared to the No Action Alternative, the magnitude of impact would be greater because of a 0.8% decrease in the number of acres closed to travel under Alternatives C and D. The types of the impacts would be the same as that described for Impacts from Management Common to All Alternatives, but the beneficial impacts of closure would be less because OHV closed areas would be reduced under these alternatives, with more of the planning area would be designated as OHV limited. The adverse impacts would be minor for the same reasons as discussed under the No Action Alternative.

Impacts of Land Use Authorizations Actions on Wildlife

Impacts from Management Common to All Action Alternatives

All action alternatives would designate a combination of "exclusion" and "avoidance" areas for ROWs, as shown in Table 4-46. ROWs would be prohibited in exclusion areas and would be avoided when possible in avoidance areas. Exclusion areas would have beneficial impacts to most wildlife because the adverse habitat fragmentation, surface disturbance, weed invasion, and displacement due to human noise and activity would not occur. Avoidance areas would often result in avoidance of negative impacts, as described for exclusion areas. However, some ROWs would be approved in these areas, and wildlife and pollinator species could be impacted by the construction of overhead power lines. Overhead power lines result in adverse impacts to some wildlife species and beneficial impacts for others. In general, overhead power lines add to habitat fragmentation. In addition, the presence of power lines raises the potential for avian species to collide with the wires or be electrocuted. On the other hand, power line towers increase perching and hunting habitat for raptor species, allowing them to hunt more efficiently. The towers are also often used for nesting and may beneficially increase raptor populations because of the greater availability of nesting sites.

Table 4-46. ROW Lands Use Authorizations by Alternative on BLM-administered Lands (acres)

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540

Impacts from the No Action Alternative

The No Action Alternative would exclude WSAs (7,056 acres) from ROW development, which would protect wildlife from the noise and surface disturbance. Approximately 30,965 acres would be managed as an avoidance area for ROWs, which would reduce negative impacts to wildlife.

Impacts from Alternative A

Alternative A would include 662,038 acres for exclusion, including the following areas: habitat for federally listed/proposed threatened and endangered species, designated and proposed critical habitat for federally threatened and endangered species, wetland and riparian areas, and lands with wilderness characteristics. Alternative A would designate 629,149 acres for ROW avoidance, including the following: BLM sensitive plant and animal species' habitat, federal candidate species' habitat, and open sand dunes. Wildlife that occurs in the areas designated as exclusion zones would benefit from the avoidance of habitat fragmentation impacts and the impacts of overhead power lines described in Impacts from Management Common to All Action Alternatives. Wildlife that occur in avoidance areas would also benefit from avoidance of habitat fragmentation, but to a lesser degree because some power lines may be approved. This alternative would be more beneficial for wildlife than the No Action Alternative because of the greatly increased acreage of habitat avoided or excluded from ROW development.

Impacts from Alternative B

Alternative B would include 918,701 acres for ROW exclusion and 413,654 acres for ROW avoidance. The nature of impacts in exclusion and avoidance areas would be similar under Alternative B to those described for Alternative A because the management actions would be similar, with large areas designated as exclusion and avoidance. This alternative would be the most beneficial for wildlife when compared to all other alternatives because of the amount of habitat avoided or excluded from ROW development.

Impacts from Alternative C

Under this alternative, 165,378 acres would be ROW exclusion areas and 313,619 acres would be avoidance areas. Lands with wilderness characteristics would constitute exclusions areas only for pipeline and power line projects, and wetland and riparian areas would constitute exclusion areas only for roads. Under this alternative, the following would be designated as avoidance areas: habitat for federally listed/proposed threatened and endangered species, designated and proposed critical habitat for federally threatened and endangered species, BLM sensitive plant and animal species' habitat, federal candidate species' habitat, and open sand dunes. Wetland and riparian areas would be avoidance areas for pipelines and power lines. Lands with wilderness characteristics would be avoidance areas for roads and sites. The impacts to wildlife would be similar to those discussed under Alternative A, but to a lesser degree. This alternative would be more beneficial for wildlife than the No Action Alternative because of the greatly increase acreages of habitat avoided or excluded from ROW development.

Impacts from Alternative D

Under this alternative, 69,540 acres would be ROW exclusion areas and 270,360 acres would be avoidance areas. Under this alternative, all of the habitat types and designations listed under the other action alternatives as exclusion or avoidance areas would be avoidance areas under this alternative, resulting in fewer beneficial impacts to wildlife than all other action alternatives. However, this alternative would still be more beneficial for wildlife than the No Action Alternative because of the increased acreages of habitat avoided or excluded from ROW development.

Impacts of Renewable Energy Management Actions on Wildlife

Impacts from Management Common to All

Renewable energy management actions consist of choosing areas where the BLM will consider applications for the permitting, construction, and maintenance of wind, solar, and geothermal energy projects. The adverse impacts on wildlife from renewable energy projects include short- and long-term displacement caused by habitat removal and surface disturbance; habitat fragmentation, especially from linear projects such as power lines and pipelines; disruption of breeding and other sensitive activities caused by human noise and disturbance; reduction in available foraging habitat and available prey; destruction of pollinator nests and potential nest sites; and removal of pollinator food resources. Each of these impacts could result in decreased health of the individual and/or of the local wildlife population.

In addition to the impacts described above, wind energy projects can also directly impact bird and bat species through collision with turbine blades (Arnett et al. 2007). For avian species, songbird and raptor mortality has been most often documented at wind farms, and due to the timing of mortality most are thought to be killed while on their migration route (Arnett et al. 2007). Migrating bats have also been killed by wind turbines from both collision and barotrauma—bursting of lung capillaries due to extreme pressure changes (Baerwald et al. 2008). Hoary and silver-haired bats have been killed most often at wind farms. In general, the presence of a wind farm raises the potential for mortality for many bird and bat species and could result in population-level impacts (Kuvlesky et al. 2007). Three years of baseline bird and bat use surveys and 2 years of post-construction surveys would be required as part of the application to permit renewables projects on public land within the planning area.

Impacts from the No Action Alternative

Under this alternative, restrictions would be placed on the locations where wind energy projects could be permitted, such as along the face of the Guadalupe Mountains, grassland areas in the northwestern portion of the planning area, within cave/karst occurrences, and ACECs. Because of these restrictions, impacts

that could result from renewable energy development, such as those described in Impacts from Management Common to All Alternatives, would be avoided in certain parts of the planning area. Wildlife occupying those areas would benefit from the restrictions. However, the short- and long-term negative impacts associated with renewable energy development could occur throughout the remainder of the planning area.

Impacts from Alternative A

Alternative A would exclude wind and solar and close areas to geothermal development in the following areas that are relevant to this discussion: lands with wilderness characteristics managed to protect wilderness characteristics or managed to emphasize other multiple uses while applying some protective management, LPC habitat areas, wetlands and riparian areas, areas along the face of the Guadalupe Mountains, grassland areas in the northwestern portion of the planning area, designated and proposed critical habitat for federally threatened and endangered species, and habitat for federally listed and proposed threatened and endangered species for which critical habitat has not been designated. Wildlife occupying those areas would benefit because the impacts associated with renewable energy development (as described in Impacts from Management Common to All Alternatives) would be avoided. Compared with the No Action Alternative, this alternative would be more beneficial to wildlife, especially those species occupying LPC habitat areas, wetland and riparian areas, and habitat for federally listed and proposed threatened and endangered species for which critical habitat has not been designated.

Impacts from Alternative B

The management actions under Alternative B are identical to Alternative A, except that wind development would be avoided (not excluded) in habitat for federally listed and proposed threatened and endangered species for which critical habitat has not been designated. Avoidance means that development could occur if no other option is feasible, and so these types of projects could occur within this habitat designation. This alternative would result in more negative impacts, as described in Impacts from Management Common to All Alternatives, than the No Action Alternative, to the wildlife inhabiting those areas.

Impacts from Alternative C

The management actions under Alternative C are identical to Alternative B, except that wind development would also be avoided (not excluded) in the grassland areas in the northwestern portion of the planning area. By not excluding this area from development, wildlife species occupying this grassland habitat could be negatively impacted from renewable energy development.

Impacts from Alternative D

The management actions under Alternative D are identical to Alternative B, except that wind development would be open in the Chaves City and Bootheel areas, which are located in the grasslands in the northwestern portion of the planning area. This alternative would result in more impacts than all other alternatives on wildlife species occupying this area.

Impacts of Leasable, Salable, and Locatable Minerals Actions on Wildlife

Impacts from Management Common to All Alternatives

Under all alternatives the BLM would continue to dispose of leasable, salable, and locatable minerals in accordance with applicable regulations. The number of acres leased would not directly correspond to the amount of habitat lost, since some leases may not be fully developed. However, it can be used as an estimate to project which areas would be more heavily impacted. Minerals leasing is divided into four categories: open, open with moderate constraints, open with major constraints (NSO), and closed/withdrawn. These categories are defined in Chapter 3, Section 3.3.1. For the purposes of wildlife impact analysis, NSO and closed are synonymous because NSO would require that there be no surface disturbances, so there would be no adverse surface-disturbing impacts to wildlife. Possible impacts for each minerals leasing category are summarized below. The precise impacts would be dependent on each project and would be analyzed in detail in the corresponding site-specific documentation required under NEPA.

Wildlife habitat designated as open could be impacted by minerals development. Impacts from minerals development include habitat removal, crushing or trampling of individuals, destruction of pollinator nests and potential nest sites, removal of pollinator food resources, habitat fragmentation, displacement from breeding locations or other sensitive habitats (e.g., wintering, roosting habitats), increased fugitive dust, changes in habitat structure or composition from the introduction and spread of invasive and weedy plant species, increased potential for ingestion of toxic substances, and increased energy expenditure from aversion to human noise and activity. These impacts can harm wildlife individuals and decrease the health and abundance of populations.

Wildlife habitat designated as open with moderate constraints would apply restrictive lease stipulations on minerals development, including actions required to mitigate negative impacts such as those listed above. Negative impacts associated with minerals development could occur in these areas, but mitigative and avoidance actions would be stipulated to avoid or reduce those impacts.

Acres designated as closed, withdrawn, or open with major constraints would avoid all negative impacts associated with minerals management actions. This is because no minerals exploration or development could take place on areas that are closed or withdrawn. Areas that would be open with major constraints would be subject to NSO, meaning that habitat would not be removed and surface-disturbing activities would not occur.

Impacts from the No Action Alternative

Under the No Action Alternative, minerals development would continue as under current conditions. A total of 57% of the BLM surface lands in the planning area would remain open for leasable minerals with standard terms and conditions, 95% would be open for salable minerals development, and 98% would be open for locatable minerals development. Overall, more of the planning area is open to minerals development under this alternative than under any of the action alternatives. Wildlife habitat and individuals could be impacted in areas open to minerals development in the ways described in Impacts from Management Common to All Alternatives.

Impacts from Alternative A

Under Alternative A, 41% of the surface lands in the planning area would remain open for leasable minerals, 42% would be open for salable mineral development, and 86% would be open for locatable minerals development. This would be a decrease in lands open to minerals development, compared with the No Action Alternative. Wildlife habitat and individuals could be impacted in areas open to minerals development in the ways described in Impacts from Management Common to All Alternatives.

High, moderate, and low productive playas would require a range of mitigation for oil and gas activities, with highly productive playas requiring the most restrictive mitigation. Mitigation for playa habitat is described in detail in Chapter 2, Alternatives Matrix. These mitigation measures would mitigate negative impacts to wildlife and their habitat of oil and gas activities in sensitive playa habitat. Without these measures, there would be increased potential for wildlife displacement, habitat degradation due to weed introduction and failed reclamation, and altered water flow. Playas are especially sensitive to these types of disturbances because they may seasonally support large numbers of migrating wildlife, such as shorebirds.

Impacts from Alternative B

Under Alternative B, 39% of the surface lands in the planning area would remain open for leasable mineral development with standard terms and conditions, 40% would be open for salable mineral development, and 76% would be open for locatable mineral development. This represents a decrease in lands open to minerals development, compared with the No Action Alternative, and is the most restrictive of all the action alternatives. Wildlife habitat and individuals could be impacted in areas open to minerals development in the ways described in Impacts from Management Common to All Alternatives, and impacts would be avoided in those areas closed to minerals development.

No surface disturbances would be allowed within 656 feet of any playa in the CFO, regardless of its productivity rating. This action would lead to similar impacts as described for Alternative A, but because it is more restrictive, the magnitude of beneficial impacts would be greater.

Impacts from Alternative C

Under Alternative C, 63% of the surface lands in the planning area would remain open for leasable mineral development with standard terms and conditions, 64% would be open for salable mineral development, and 95% would be open for locatable mineral development. This represents a decrease in lands open to minerals development, compared with the No Action Alternative. Wildlife habitat and individuals could be impacted in areas open to minerals development in the ways described in Impacts from Management Common to All Alternatives.

The management actions regarding playas under this alternative would be identical to Alternative A, resulting in identical impacts.

Impacts from Alternative D

Under Alternative D, 72% of the surface lands in the planning area would remain open for leasable mineral development, 73% would be open for salable mineral development, and 96% would be open for locatable mineral development. This represents a decrease in lands open to minerals development, compared with the No Action Alternative; however, it is the least restrictive, compared with all other action alternatives. Wildlife habitat and individuals could be impacted in areas open to minerals development in the ways described in Impacts from Management Common to All Alternatives.

There would be no management actions regarding playas, which would result in the same impacts as described for the No Action Alternative.

Impacts of ACEC Actions on Wildlife

Impacts from Management Common to All

ACEC management decisions would generally reduce long-term impacts to wildlife species that occur inside their boundaries. Impacts to wildlife vary among alternatives, based on the acreage of areas designated as ACECs and the land management prescriptions within each area. ACECs are designated to protect identified relevant and important values, such as cultural resources, scenic qualities, and natural systems. Each ACEC is prescribed various levels of limitations on activities such as oil and gas leasing, ROWs development, renewables development, livestock grazing, and travel. See Chapter 2, Alternatives Matrix - Special Designations, for details on ACEC prescriptions by alternative. In general, ACEC designation would reduce the adverse impacts to wildlife and their habitat by limiting human activity and associated surface disturbances and thereby prevent habitat loss and degradation.

Impacts from Management Common to All Action Alternatives

Under all action alternatives, additional ACECs would be established across the planning area, with beneficial impacts on non-game species through reduced potential for habitat loss, degradation, and fragmentation and reduced noise disturbance. For example, the Cave Resources ACEC (19,625 acres) which includes Boyd's Cave, Burton's Flat Cave Complex, Chosa Draw Caves, Fence Canyon Caves, Lost Cave, Manhole/Mudgett's Caves, McKittrick Hill Caves, Sinkhole Flats, and Yellowjacket Cave, would be designated and would be managed with numerous prescriptions, including NSO within 656 feet of surface drainages that feed into cave systems, withdrawal of the ACEC from solid mineral extraction and disposal, restriction of motorized vehicles to established roads, and OHV limited travel. All of these management actions would prevent adverse impacts on the local wildlife, such as surface disturbance and human noise and activity.

Impacts from the No Action Alternative

Under the No Action Alternative, the five already established ACECs, totaling 13,453 acres, would continue to be managed as ACECs. Management would continue under current conditions. Restrictions put in place for the protection of those important resources in each ACEC would likely benefit wildlife by limiting the

amount of habitat loss or degradation and reducing the potential for noise disturbance. For example, restrictions within the Lonesome Ridge ACEC have been put in place to ensure that the area's outstanding natural values persist through time in an unaltered condition. As a result, activities permitted within the ACEC are restricted to primitive non-motorized recreational opportunities, including cave exploration, hiking on semi-developed trails, hunting, and outstanding opportunities for wildlife and scenic photography, all of which are activities that would have a negligible impact on wildlife individuals.

Impacts from Alternative A

Under Alternative A, 495,042 acres would be designated as ACECs, approximately 36 times more area than the No Action Alternative. Because the ACEC designation carries with it management actions that result in less surface disturbance and stricter management restrictions and stipulations than current conditions, the ACEC designation under Alternative A would have beneficial impacts for many wildlife species. Compared to the No Action Alternative, this alternative would be substantially more beneficial for wildlife because a much greater acreage would be managed for wildlife protection under ACEC prescriptions.

Impacts from Alternative B

Under Alternative B, 561,441 acres would be managed as ACECs, which is more than any other alternative and more than 40 times more area than the No Action Alternative. The ACECs proposed under Alternative B include Salt Playas, Desert Heronries, and Maroon Cliffs, all of which would not become designated ACECs under the other alternatives. Because the ACEC designation carries with it management actions that result in less surface disturbance and stricter management restrictions and stipulations than current conditions, this alternative would provide the greatest benefits for wildlife species among all alternatives. The impacts would be the same as discussed for Alternative A, but to a greater degree because more of the planning area would be managed as ACECs. Compared to the No Action Alternative, the impacts would be the same as discussed under Alternative A for the same reasons.

Impacts from Alternative C

Under Alternative C, 98,563 acres would be managed as ACECs, which is seven times more than the No Action Alternative. A total of eight ACECs would be designated under Alternative C, and of those, six would contain riparian areas and riparian vegetation, resulting in increased protection for riparian habitats. The impacts would be the same as discussed under Alternative, but to a lesser degree because of the substantially smaller ACEC acreage, with the same comparison to the No Action Alternative for the same reasons.

Impacts from Alternative D

Under Alternative D, 28,894 acres would be managed as ACECs, which is more than twice the No Action Alternative acreage and the smallest area among the action alternatives. In addition to those listed under the No Action Alternative, four ACECs would be designated: Lonesome Ridge, Maroon Cliffs, Pecos River Canyon Complex, and Serpentine Bends. The impacts would be the same as discussed under Alternative C, but to a lesser degree, because the acreage designated as ACECs would be smaller. This alternative would be the least protective of wildlife when compared to the other action alternatives.

4.2.5 Special Status Species

This section discusses impacts to special status plants, fish, and terrestrial animals from management actions of other resources and resource uses discussed in Chapter 2. Existing conditions concerning special status species are described in Section 3.2.6.

4.2.5.1 Special Status Plants

Special status plants are those that occur on USFWS, New Mexico Energy, Minerals and Natural Resources Department, and/or BLM lists of threatened, endangered, and otherwise sensitive species. The special status plant species analyzed in this section are described in detail in Section 3.2.6, and locations of known habitat are displayed in Map 3-8.

4.2.5.1.1 Analysis Methods

Indicators

Acres of special status plant habitat are used for assessing impacts from management actions across alternatives. Known acres of gypsum wild buckwheat (*Eriogonum gypsophilum*), Kuenzler's hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*), and Lee's pincushion cactus (*Escobariasneedii sneedii* var. *leei*) habitats were used as quantifiable indicators in the analysis. Impacts to all other species are discussed in terms of the vegetative communities impacted, as described in Section 3.2.6.1. Occurrences of Tharp's bluestar (*Amsonia tharpii*) and Scheer's beehive cactus (*Coryphantha robustispina* var. *scheeri*) in the CFO planning area are also known, but habitat areas have not been quantified (Map 3-8). Impacts to these two species are also discussed in terms of vegetative communities.

Methods and Assumptions

Impacts to special status plants from management actions of the following resources, resources uses, and special designations are analyzed in detail: vegetative communities, wildland fire and fuels management, lands with wilderness characteristics, air resources, minerals, land use authorizations, renewable energy, livestock grazing, travel management, and special designations. Impacts from soil resources, water resources, cave and karst, special status species, cultural resources, paleontological resources, visual resources, land tenure, ONAs, RNAs, SMAs, backcountry byways, and wilderness areas are not analyzed in detail. These resources, resources uses, and special designations are not analyzed because there would be no or negligible impacts to special status plants as a result of those management actions due to the assessment that special status plant habitat would not be measurably altered and individuals would not be impacted. Management actions related to tribal rights and interests, social and economic conditions, and public safety do not authorize, contemplate, or otherwise intersect with surface-disturbing activities or the mitigation thereof, so these decisions also do not impact special status plants.

Impacts to special status plants from management actions are analyzed based on the scientific literature, including published and government studies, and local knowledge of the area. All habitat impacts analyzed in this section are approximations based on delineated habitat and assumptions regarding potential locations of facilities, vegetation treatments, grazing, and other management decisions.

The alternatives have potential for both adverse and beneficial impacts on special status plants through management actions such as travel management, recreational use of lands, noxious weed treatment, and minerals development. Wherever possible, this document quantifies the amount and type of habitats that would be directly disturbed or reclaimed due to such actions. However, it is often difficult to quantify the loss or improvement in quality of the condition of a habitat. Subtle increases or decreases in weeds, shrubs, forbs, water availability, and undisturbed areas can greatly affect the distribution, health, and survival of sensitive plant species. The degree to which these impacts could occur varies by alternative, with alternatives that increase the amount of surface disturbance within special status plant species' habitats generally having greater potential adverse impacts on these species. Attempts are made to address potential impacts within each action analysis, but the discussions are often qualitative due to the difficulty in measuring such changes. Furthermore, due to the programmatic nature of the plan, analysis must be conducted at the landscape level, with detailed analysis being very difficult if not impossible. Detailed analysis is more appropriate at the site-specific planning scale because the impacts can be more precisely forecast when siting and construction details are known about proposed projects.

Inherent to the "special status" designation, many of these species are vulnerable to extinction by natural processes or human disturbance (Stephens and Sutherland 1999). The analysis in this section is largely based on the concept that increases in population size, occupied habitat, and available habitat are beneficial impacts on special status plants species. This is because larger population sizes lead to increased genetic variability, which may increase a species' ability to respond to changing environmental conditions, decrease the risk of inbreeding depression, and persist after random and/or large disturbance events, all of which can decrease fertility and survival rates. Due to the programmatic nature of this document, the potential for extinction resulting from specific management actions cannot be assessed.

Gypsum wild-buckwheat has been proposed for delisting. The recovery and delisting of gypsum wild buckwheat relies on the BLM and industry partners continuing their legacy of gypsum wild-buckwheat conservation. This 990 foot (300 meters) avoidance buffer, consistent with the USFWS minimum "No Effects" distance for the direct and indirect adverse effects of surface denuding activities on sensitive plants (USFWS 2013) will enable natural resource managers to relocate surface-displacing activities, when appropriate, to avoid adverse direct and indirect impacts to gypsum wild-buckwheat. This avoidance buffer would keep lease parcels available for energy development in a manner consistent with gypsum wild-buckwheat conservation. A total of 2,115 acres, dispersed across four locations, would be expected to be affected by this buffer; this is 0.10% of the total 2,091,369 ac of BLM administered surface in the planning area. The expected impact to energy development would be isolated and slight. These impacts would be minimized by making avoidance areas available to operators before they develop and submit drill plans for permitting. If the specie is delisted BLM will update its management prescriptions in accordance with any change in Gypsum wild-buckwheat status.

4.2.5.1.2 Direct and Indirect Impacts

Impacts of Vegetative Communities Management Actions on Special Status Plants

Impacts from Management Common to All

Under all alternatives, the objectives of noxious weed control are to minimize or stop the spread of noxious and other exotic invasive plant species, including single seed juniper. The encroachment of single seed juniper into grassland habitat reduces the amount of available Kuenzler's hedgehog cactus habitat. All noxious weed control targeting juniper would benefit Kuenzler's hedgehog cactus by reclaiming historic habitat areas and potentially creating additional habitat that would be available for colonization, thus allowing the population abundance to be maintained and potentially to grow.

Impacts of Wildland Fires and Fuels Management Actions on Special Status Plants

Impacts from Management Common to All Alternatives

Under all alternatives, wildland fire would be used to protect or enhance resource values. When possible, fire would be allowed to function in its natural ecological role. Wildland fire can be both beneficial and harmful to special status plant populations. Historic fire suppression has led to conditions in many fire-adapted areas that are overgrown and in need of fire (Allen et al. 2002). Wildland fire in these areas would help restore the ecosystem to a healthier state, potentially making the habitat more suitable for colonization by special status plant species and supporting range expansion. However, many special status plant species are not adapted to withstand wildland fire, and individuals and populations could be burned beyond recovery, leading to a reduction in overall population abundance. Special status plant species are inherently vulnerable to population declines from large-scale disturbance, such as wildfire, because of the limited amount of available suitable habitat and/or already small population sizes. Because of this, large-scale wildfire could be detrimental to special status plant populations. Exact impacts, whether beneficial or harmful, would depend on the location and nature of each individual fire.

Impacts of Lands with Wilderness Characteristics Management Actions on Special Status Plants

The lands with wilderness characteristics alternatives consist of differing amounts of acres managed to protect those characteristics. Table 4-47 displays the acres of Kuenzler's hedgehog cactus and Lee's pincushion cactus habitat that overlap with lands with wilderness characteristics that are being managed to protect wilderness characteristics by alternative. No gypsum wild buckwheat habitat overlaps with lands with wilderness characteristics. Other special status plant populations for which there is no geographical information may also occur on lands proposed with wilderness characteristics.

Table 4-47. Lands with Wilderness Characteristics Overlapping Potential Special Status Plant Species Populations by Alternative on BLM-administered Lands

Special Status Plant Species	No Action	Alternative A (acres/% habitat)	Alternative B (acres/% habitat)	Alternative C (acres/% habitat)	Alternative D (acres/% habitat)
Kuenzler's hedgehog cactus (potential habitat)	NA	16,153/17%	16,153/17%	2,734/3%	1,993/2%
Lee's pincushion cactus habitat	NA	115/91%	115/91%	115/91%	115/91%
Total lands with wilderness characteristics designated	NA	66,666	47,611	5,119	1,221

Impacts from Management Common to All Action Alternatives

Under all action alternatives, lands with wilderness characteristics would be managed to reduce or eliminate surface disturbance and other impacts and maintain those characteristics. Some of the management prescriptions include the exclusion of ROWs, closure to new road construction, closure to motor vehicles, restricted construction of new structures, and limitations on minerals development. Managing lands to maintain wilderness characteristics is beneficial for special status plants because future potential impacts associated with human disturbance (motorized recreation, minerals development) and construction (new roads and structures, infrastructure) would be avoided. Special status plant populations would be allowed to occur in a natural setting, without the threat of disturbance. Furthermore, these lands would be retained in federal ownership, guaranteeing these management prescriptions for the planning period.

No acres of known wild gypsum buckwheat habitat overlaps areas that would be managed for wilderness characteristics, so there would be no known benefit to this species as a result of these management actions.

Impacts from the No Action Alternative

Under the No Action Alternative, no lands with wilderness characteristics would be designated, meaning that special status plant populations would not gain the increased protections on the newly designated lands, as described above. The No Action Alternative would not result in the beneficial impacts described in Impacts from Management Common to All Action Alternatives on newly designated lands.

Impacts from Alternative A

Under Alternative A, 66,666 acres would be managed as lands with wilderness characteristics, including 16,153 acres (17%) of potential Kuenzler's hedgehog cactus habitat and 115 acres (91%) of Lee's pincushion cactus habitat. This alternative is the most inclusive, compared with all other alternatives, and would provide the beneficial impacts described in Impacts from Management Common to All Action Alternatives on the largest area. The nature of impacts on special status species would be identical to that described for the Impacts from Management Common to All Action Alternatives. Other special status plant species may also benefit from this designation if located in lands with wilderness characteristics.

Impacts from Alternative B

Under Alternative B, 47,611 acres would be managed as lands with wilderness characteristics, including 16,153 acres (17%) of potential Kuenzler's hedgehog cactus habitat and 115 acres (91%) of Lee's pincushion cactus habitat. The nature of impacts on special status species would be identical to that described for the Impacts from Management Common to All Action Alternatives. Other special status plant species may also benefit from this designation if located in lands with wilderness characteristics.

Impacts from Alternative C

Under Alternative C, 5,119 acres would be managed as lands with wilderness characteristics, including 2,734 acres (3%) of potential Kuenzler's hedgehog cactus habitat and 115 acres (91%) of Lee's pincushion cactus habitat. The nature of impacts on special status species would be identical to that described for the Impacts from Management Common to All Action Alternatives, except there would be no benefit for Lee's pincushion cactus because no habitat would be lands with wilderness characteristics. Other special status plant species may also benefit from this designation if located in lands with wilderness characteristics.

Impacts from Alternative D

Under Alternative D, 1,221 acres would be managed as lands with wilderness characteristics, including 1,993 acres (2%) of potential Kuenzler's hedgehog cactus habitat and 115 acres (91%) of Lee's pincushion cactus habitat. The nature of impacts on that species would be identical to that described for the No Action Alternative; however, other special status plant species may benefit if located in lands with wilderness characteristics.

Impacts of Air Resources Management Actions on Special Status Plants

Impacts from the No Action Alternative

Under the No Action Alternative, stipulations regarding fugitive dust would be incorporated into project proposals as needed to meet air quality standards. Fugitive dust could result from construction activities, vehicle traffic, equipment operations, and wind events. Dust can harm vegetation by injuring leaves and reducing transpiration, photosynthesis, and growth rates, thereby reducing overall fitness and resiliency (Farmer 1993; Sharifi et al. 1997). Special status plant species populations, especially those located near unpaved roads and surface-disturbing activities, could be impacted by fugitive dust. Incorporating stipulations to maintain air quality would help to mitigate the negative impacts of dust.

Impacts from Alternatives A and B

Alternatives A and B would require twice-daily watering (or equivalent) of construction areas and associated roads to prevent at least 50% of fugitive dust from vehicular traffic, equipment operations, or wind events. This action would be beneficial for special status plants because it would reduce potential for fugitive dust impacts, as described for the No Action Alternative.

Impacts from Alternatives C and D

Alternatives C and D do not include a similar management action, meaning that fugitive dust mitigation for site-specific impacts would be determined during permitting. Under these alternatives, the potential for impacts of fugitive dust on special status plants would be the same as under the No Action Alternative because the end result of required mitigation actions would be the same.

Impacts of Minerals Allocations Management Actions (Leasable, Salable, and Locatable) on Special Status Plants

Impacts from Management Common to All Alternatives

Minerals designation definitions are given in Section 3.3.1. The impacts analysis below is based on potential for the following impacts.

Acres designated as open could be impacted by minerals development. Impacts from minerals development include habitat removal, crushing or trampling of individuals, habitat fragmentation, increased fugitive dust, and changes in habitat structure or composition due to the introduction and spread of invasive and weedy plant species. These impacts could decrease the health of populations of special status plant species.

Acres designated as open with moderate constraints would apply restrictive lease stipulations on minerals development, including actions required to mitigate the negative impacts listed above. Negative impacts associated with minerals development could occur in these areas, but mitigative and avoidance actions would be stipulated to lessen and mitigate those impacts.

Acres designated as closed, withdrawn, or open with major constraints would avoid all negative impacts on special status plants species associated with minerals management actions. This is because no minerals exploration or development could take place on areas that are closed or withdrawn. Areas that would be open with major constraints would be subject to NSO, meaning that habitat would not be removed and surface-disturbing activities would not occur.

Table 4-48 displays acres of special status plant habitat impacted by minerals management decisions.

Table 4-48. Minerals Management Decisions (acres and % of habitat) by Alternative on BLM-administered Lands

Species	Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable Minerals						
Gypsum wild buckwheat	Closed and open with major constraints designations	177/100%	177/100%	177/100%	177/100%	177/100%
	Open with moderate constraints	0/0%	0/0%	0/0%	0/0%	0/0%
	Open designations	0/0%	0/0%	0/0%	0/0%	0/0%
Kuenzler's hedgehog cactus	Closed and open with major constraints designations	5,952/6%	36,589/38%	36,586/38%	4,229/4%	4,228/4%
	Open with moderate constraints	16,010/16%	1,977/2%	1,977/2%	21,390/22%	915/1%
	Open designations	74,772/78%	58,184/60%	58,184/60%	71,107/73%	91,601/95%
Lee's pincushion cactus	Closed designations	127/100%	127/100%	127/100%	127/100%	127/100%
Salable Minerals						
Gypsum wild buckwheat	Closed designation	177/100%	136/77%	163/92%	177/100%	177/100%
	Open with special terms and conditions	0/0%	0/0%	0/0%	0/0%	0/0%
	Open designation	0/0%	40/23%	14/8%	0/0%	0/0%
Kuenzler's hedgehog cactus	Closed designation	5,405/6%	26,387/27%	26,332/27%	3,913/44%	4,228/4%
	Open with special terms and conditions	0/0%	9,273/10%	9,288/10%	21,377/22%	3,511/4%
	Open designation	91,340/94%	61,087/63%	61,087/42%	71,450/74%	89,007/92%
Lee's pincushion cactus	Closed designation	127/100%	127/100%	127/100%	127/100%	127/100%
Locatable Minerals						
Gypsum wild buckwheat	Withdrawn	36/20%	136/77%	165/93%	40/23%	40/23%
	Open designation	141/80%	40/23%	12/7%	137/77%	137/77%
Kuenzler's hedgehog cactus	Withdrawn	3,752/4%	26,219/27%	26,220/27%	4,067/5%	4,067/5%
	Open designation	92,984/97%	70,527/73%	70,526/73%	92,676/96%	92,679/96%
Lee's pincushion cactus	Withdrawn	115/91%	127/100%	127/100%	127/100%	127/100%
	Open designation	12/9%	0/0%	0/0%	0/0%	0/0%

Table 4-48 displays acres of known habitat for three special status plant species; however, areas open to minerals development could also impact special status plant species for which habitat is not defined and/or known at this time.

Impacts from Management Common to All Action Alternatives

Under all Action Alternatives for leasable and salable minerals, Lee's pincushion cactus would be managed as closed designation.

Impacts from the No Action Alternative

Leasable Minerals

Under the No Action Alternative, 100% (177 acres) of gypsum wild buckwheat habitat would be open with major constraints (NSO). At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under the No Action Alternative, 6% (5,952 acres) of known Kuenzler's hedgehog cactus habitat would be subject to closure or

NSO, 16% (16,010 acres) would have moderate constraints, and 77% (74,722 acres) would be open to leasable mineral development on BLM surface lands. Under the No Action Alternative, known Lee's pincushion cactus habitat would be subject to closure. The No Action Alternative would designate the least amount of acres of special status plant habitat as open, compared with all other alternatives, which would subject special status plants to the adverse impacts described in Impacts from Management Common to All Alternatives.

Salable Minerals

Under the No Action Alternative, 100% (177 acres) of gypsum wild buckwheat habitat would be managed as closed. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under the No Action Alternative, 6% (5,405 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to closure or NSO and 94% (91,340 acres) would be open to salable minerals. Under the No Action Alternative, known Lee's pincushion habitat would be subject to closure. The No Action Alternative would designate the greatest amount of acres of special status plant habitat as open, compared with all other alternatives, which would subject special status plants to the adverse impacts described in Impacts from Management Common to All Alternatives.

Locatable Minerals

Under the No Action Alternative, 20% (36 acres) of gypsum wild buckwheat habitat on BLM surface lands would be withdrawn or recommended for withdrawal and 80% (141 acres) would be open to locatable mineral development. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. The No Action Alternative would withdraw or recommend for withdrawal 4% (3,752 acres) of potential Kuenzler's hedgehog cactus habitat from locatable mineral development and open 96% (92,984 acres) habitat to locatable mineral development on BLM surface lands. The No Action Alternative would withdraw 91% (115 acres) of known Lee's pincushion habitat from locatable mineral development and open 9% (12 acres) habitat to locatable mineral development on BLM surface lands. The No Action Alternative would designate the greatest amount of acres of special status plant habitat as open, compared with all other alternatives, which would subject special status plants to the adverse impacts described in Impacts from Management Common to All Alternatives.

Impacts from Alternative A

Under all impacts from Alternative A, all known Lee's pincushion habitat (127 acres) would be closed to or withdrawn from leasable, salable, and locatable minerals development. This management action would avoid all impacts from minerals development on that species.

Leasable Minerals

Under Alternative A, 100% (177 acres) of gypsum wild buckwheat habitat would be closed to leasable mineral development on BLM surface lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative A, 38% (36,589 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to closure or NSO, 2% (1,977 acres) would have moderate constraints, and 60% (58,124 acres) would be open to leasable mineral development on BLM surface lands. This alternative would avoid more negative impacts than the No Action Alternative by closing or subjecting more habitat to NSO stipulations and opening the smallest amount of habitat to leasable minerals.

Salable Minerals

Under Alternative A, 77% (136 acres) of gypsum wild buckwheat habitat would be closed to salable mineral development and 23% (40 acres) would be open to salable mineral development. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private

ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative A, 27% (26,387 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to closure or NSO, 10% (9,273 acres) would be open with special terms and conditions, and 42% (61,087 acres) would be open to salable minerals. This alternative would avoid more adverse impacts than the No Action Alternative by closing or subjecting more habitat to NSO stipulations and opening the smallest amount of habitat to salable minerals.

Locatable Minerals

Under Alternative A, 77% (136 acres) of gypsum wild buckwheat habitat on BLM surface lands would be withdrawn from locatable minerals and 23% (40 acres) would be open from locatable minerals on BLM surface lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Alternative A would withdraw or recommend for withdrawal 27% (26,219 acres) of known Kuenzler's hedgehog cactus habitat from locatable mineral development and open 73% (70,527 acres) more habitat to locatable mineral development on BLM surface lands. This alternative would avoid more adverse impacts than the No Action Alternative by closing or subjecting more habitat to closures.

Impacts from Alternative B

Under all impacts from Alternative B, all known Lee's pincushion habitat (127 acres) would be closed to or withdrawn from leasable, salable, and locatable minerals development. This management action would avoid all impacts from minerals development on that species.

Leasable Minerals

Impacts to Kuenzler's hedgehog cactus from leasable mineral management decisions under Alternative B would be the same as under Alternative A because the management actions and acres of impact would be the same.

Under Alternative B, 100% (177 acres) of gypsum wild buckwheat habitat would be closed to leasable mineral development on BLM surface lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. This alternative would be the most beneficial for this species because of the closures and NSO stipulations.

Salable Minerals

Under Alternative B, 92% (163 acres) of gypsum wild buckwheat habitat would be closed and 8% (14 acres) would be open to salable mineral development on BLM lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative B, 27% (26,332 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to closure or NSO, 10% (9,288 acres) of the habitat would be open with special terms and conditions, and 42% (61,087 acres) would be open to salable minerals on BLM surface lands. This alternative would be the most beneficial for these species because of the closures and NSO stipulations.

Locatable Minerals

Under Alternative B, 93% (165 acres) of gypsum wild buckwheat habitat would be withdrawn and 7% (12 acres) would be open to locatable mineral development on BLM surface lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Alternative B would subject 27% (26,220 acres) of potential Kuenzler's hedgehog cactus habitat to withdrawal from locatable minerals, and 73% (70,526 acres) would be open on BLM surface lands. This alternative would be the most beneficial for this species because of the closure and NSO stipulations.

Impacts from Alternative C

Under all impacts from Alternative C, all known Lee's pincushion habitat (127 acres) would be closed to or withdrawn from leasable, salable, and locatable minerals development. This management action would avoid all impacts from minerals development on that species.

Leasable Minerals

Under Alternative C, 100% (177 acres) of gypsum wild buckwheat habitat would be managed as open with major constraints to leasable mineral development on BLM lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative C, 4% (4,229 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to closure or NSO, 22% (21,390 acres) would be open with moderate constraints, and 73% (71,107 acres) would be open to leasable mineral development on BLM surface lands. This alternative would avoid more negative impacts than the No Action Alternative by closing or subjecting more habitat to NSO stipulations and opening the least amount of habitat to leasable minerals.

Salable Minerals

Under Alternative C, 100% (177 acres) of gypsum wild buckwheat habitat would be closed to salable mineral development on BLM lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative C, 44% (3,913 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to closure or NSO, 22% (21,377 acres) would be open with special terms and conditions, and 74% (71,450 acres) would be open to salable mineral development on BLM surface lands. This alternative would avoid more negative impacts than the No Action Alternative by closing or subjecting more habitat to NSO stipulations and opening the smallest amount of habitat to salable minerals.

Locatable Minerals

Under Alternative C, 23% (40 acres) of gypsum wild buckwheat habitat would be withdrawn and 77% (137 acres) would be open to locatable mineral development. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative C, 5% (4,067 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to withdrawal from locatable mineral development, and 96% (92,676 acres) would be open on BLM lands. This alternative would avoid more negative impacts than the No Action Alternative by closing or subjecting more habitat to NSO stipulations and opening the least amount of habitat to locatable mineral development.

Impacts from Alternative D

Under all impacts from Alternative D, all known Lee's pincushion habitat (127 acres) would be closed to or withdrawn from leasable, salable, and locatable minerals development. This management action would avoid all impacts from minerals development on that species.

Leasable Minerals

Under Alternative D, 100% (177 acres) of gypsum wild buckwheat habitat would be managed as open with major constraints. to leasable mineral development on BLM lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative D, 4% (4,228 acres) of potential Kuenzler's hedgehog cactus habitat would be closed to leasable minerals on BLM lands, 1% (915 acres) of the habitat would be open with moderate constraints, and 95% (91,601 acres) of the habitat would be open to leasable mineral development with standard terms and conditions on BLM lands. This alternative would designate the greatest amount of habitat open to leasable mineral development and would have potential for the greatest amount of negative impacts on special status species.

Salable Minerals

Under Alternative D, 100% (177 acres) of gypsum wild buckwheat habitat would be closed on BLM surface lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative D, 4% (4,228 acres) of potential Kuenzler's habitat would be subject to closure or NSO, 4% (3,511 acres) habitat would be open with special terms and conditions, and 92% (89,007 acres) habitat would be open to salable mineral development on BLM lands. This alternative would designate the greatest amount of habitat open to salable mineral development and would have potential for the greatest amount of negative impacts on special status species.

Locatable Minerals

Under Alternative D, 23% (40 acres) of gypsum wild buckwheat habitat would be withdrawn and 77% (137 acres) would be open to locatable mineral development on BLM lands. At this time, there are no known gypsum wild buckwheat populations on lands with federal mineral rights and state or private ownership; however, should this species be discovered on BLM lands, applicable lease stipulations protecting this species would apply. Under Alternative D, 5% (4,067 acres) of potential Kuenzler's hedgehog cactus habitat would be subject to withdrawal from locatable mineral development, and 96% (92,679 acres) would be open on BLM lands. This alternative would designate the greatest amount of habitat open to locatable minerals, and would have potential for the greatest amount of negative impacts on special status species.

Impacts of Land Use Authorizations Management Actions on Special Status Plants

Impacts from Management Common to All Alternatives

Land use authorization generally manages ROWs for linear projects, such as power lines, pipelines, and roads. Development from land use authorizations could lead to negative impacts on special status plant species such as habitat removal, crushing or trampling of individuals, increased habitat fragmentation, increased fugitive dust, and changes in habitat structure or composition from the introduction and spread of invasive and weedy plant species (Forman and Alexander 1998; Forman et al. 2003). These impacts can harm special status plant individuals, as well as decrease the health of populations, by creating barriers for seed dispersal. This may result in decreased reproduction rates and/or reduced genetic flow, stunted growth from reduced transpiration rates, and increased competition for resources.

Table 4-49 displays the amount of gypsum wild buckwheat, Kuenzler's hedgehog cactus, and Lee's pincushion cactus habitat that would be open, avoided, or excluded from ROW development under each alternative.

Table 4-49. Land Use Authorizations Management Decisions on BLM-administered Lands

Species	Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Gypsum wild buckwheat	Open	139/79%	38/21%	12/7%	12/7%	136/77%
	Avoid	36/20%	0/0%	0/0%	125/71%	0/0%
	Exclude	0/0%	136/77%	163/92%	38/21%	38/21%
Kuenzler's hedgehog cactus	Open	48,467/95%	21,134/22%	21,134/22%	29,260/30%	49,311/51%
	Avoid	5,029/5%	1,198/1%	1,198/1%	20,964/22%	923/11%
	Exclude	2,985/3%	31,579/33%	31,579/33%	3,681/4%	3,672/4%
Lee's pincushion cactus	Open	12/10%	0/0%	0/0%	0/0%	0/0%
	Avoid	115/90%	0/0%	0/0%	0/0%	0/0%
	Exclude	0/0%	127/100%	127/100%	127/100%	127/100%

Impacts from Management Common to All Action Alternatives

Under all action alternatives, 90% (115 acres) to 100% (127 acres) of Lee's pincushion cactus habitat would be avoided or excluded to ROW development. This would be beneficial for this species because it would greatly minimize or avoid the adverse impacts described in Impacts from Management Common to All Alternatives.

Impacts from the No Action Alternative

Lands acquired for special status species would be considered exclusion areas (areas for which ROW development is prohibited), although there are no exclusion area locations specifically defined under this alternative. Development would be avoided in specially designated areas such as SMAs, ACECs, and WSAs. Exclusion areas would avoid the impacts described in Impacts from Management Common to All Alternatives. Those impacts would occur in avoidance areas where linear projects are permitted. However, it is expected that fewer projects would be allowed in avoidance areas, and this would thereby decrease the impacts on special status plants.

Impacts from Alternative A

Under Alternative A, designated and proposed critical habitat for federally threatened and endangered species, and habitat for federal listed/proposed threatened and endangered species for which critical habitat has not been designated would be considered exclusion areas for ROWs for pipelines, roads, communication sites, and power line development. This management action would help avoid the potential for the negative impacts on federally threatened and endangered plants, as described under Impacts from Management Common to All Alternatives.

Habitat for federal candidate and BLM sensitive plant species would be considered avoidance areas for ROWs, meaning that these areas would be avoided if possible, but may be considered if no other routes or sites are feasible. This management action would discourage ROW development in habitat areas, and so would likely avoid the negative impacts described in Impacts from Management Common to All Action Alternatives when other routes or sites could be used. If no other routes or sites are feasible, negative impacts resulting from ROW development could impact these species.

Impacts from Alternative B

Impacts from Alternative B would be identical to impacts under Alternative A, except that habitat for federal candidate species would also be considered exclusion areas. BLM sensitive plant species' habitats would remain avoidance areas.

Impacts from Alternatives C and D

Under Alternative C, designated and proposed critical habitat for federally threatened and endangered species, habitat for federal listed/proposed threatened and endangered species for which critical habitat has not been designated, habitat for federal candidate species, and BLM sensitive plant species' habitat would be ROW avoidance areas. No special status plant species' habitats would be exclusion areas. This management action would lead to the negative impacts described under Impacts from Management Common to All Action Alternatives on special status plant species if no routes or sites that would avoid habitat would be feasible.

Impacts of Renewable Energy Management Actions on Special Status Plants

Impacts from Management Common to All

Renewable energy management actions consist of choosing areas where the BLM will consider applications for the permitting, construction, and maintenance of wind, solar, and geothermal energy projects. Impacts from renewable energy projects on special status plants in the areas designated as "open" to wind and geothermal or "variance" for solar development include short- and long-term habitat loss and degradation due to surface disturbance; and habitat fragmentation, especially from linear aspects of projects such as power lines and pipelines. Each of these impacts could result in decreased health of the

individual and/or of the local population. Areas designated as "avoid" for wind development would be less likely to incur these impacts, because development would be avoided; however, development and associated impacts could still occur if the development was allowed. The adverse impacts resulting from surface-disturbing activities and habitat fragmentation would not occur from renewable energy development under the "exclude" or "close" designations. Table 4-50 presents the planning area BLM-administered lands open/variance, avoided, and closed/exclude for renewable energy (geothermal, solar, and wind) under each alternative.

Under Alternatives A through D, 100% (127 acres) of Lee's pincushion cactus habitat would be withdrawn from geothermal, solar, and wind energy. Under the No Action Alternative for geothermal and solar development, 100% (127 acres) would be withdrawn from renewables development and 100% (127 acres) would be avoided for wind development.

Table 4-50. Renewable Energy Management Decisions on BLM-administered Lands

Species	Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Geothermal and Solar						
Gypsum wild buckwheat	open/variance	0/0%	78/44%	14/8%	14/8%	139/78%
	close/exclude	175/98%	136/78%	165/93%	163/93%	38/22%
Kuenzler's hedgehog cactus	open/variance	46/<1%	62,869/65%	62,869/65%	64,581/67%	82,189/85%
	close/exclude	5,385/6%	33,864/35%	33,849/35%	32,136/33%	14,526/15%
Wind						
Gypsum wild buckwheat	Open	0/0%	38/22%	12/7%	12/7%	136/77%
	Avoid	175/98%	0/0%	0/0%	121/69%	0/0%
	Exclude	0/0%	136/78%	163/93%	38/21%	38/22%
Kuenzler's hedgehog cactus	Open	1,509/2%	21,134/22%	21,126/22%	21,163/22%	22,951/24%
	Avoid	49,339/51%	1,198/1%	1,198/1%	11,054/11%	27,284/28%
	Exclude	2,985/3%	31,579/33%	31,587/33%	3,672/4%	3,672/4%

Impacts from Management Common to All Action Alternatives

Wind development would be encouraged in areas where transmission corridors are located, or where transmission systems are already in place. Adverse impacts on special status plants due to surface disturbance and habitat fragmentation would be avoided by siting wind development near transmission. This is because power lines would not need to be constructed to connect the wind facility with a transmission line.

Impacts from the No Action Alternative

Under the No Action Alternative, 98% (175 acres) of known gypsum wild buckwheat habitat would be closed or excluded from geothermal and solar development, and 98% (175 acres) would be avoided for wind development. Under the No Action Alternative for potential Kuenzler's hedgehog cactus habitat, less than 1% (46 acres) would be open and 6% (5,385 acres) would be closed to geothermal and solar development. Under the No Action Alternative, 2% (1,509 acres) would be open, 51% (49,339 acres) would be avoided, and 3% (2,985 acres) would be closed or excluded from wind development within potential Kuenzler's hedgehog cactus habitat. This alternative would remove more habitat than all other alternatives from geothermal and solar development, benefiting these special status plant species by avoiding the impacts described in Impacts from Management Common to All Alternatives. The avoidance of all habitat for wind development would make adverse impacts less likely to occur than if the areas were open for development.

Impacts from Alternative A

Under Alternative A, 44% (78 acres) of known gypsum wild buckwheat habitat would be open to geothermal and solar development and 78% (136 acres) of habitat would be closed or excluded. Under Alternative A, 7% (12 acres) of gypsum wild buckwheat habitat would be open to wind development and 93% (163 acres) would be excluded. In addition, 65% (62,869 acres) of potential Kuenzler's hedgehog cactus habitat would

be open to geothermal and solar development and 35% (33,864 acres) of habitat would be closed or excluded. Under Alternative A, 22% (21,126 acres) of potential Kuenzler's hedgehog cactus would be open to wind development, 1% (1,198 acres) would be avoided and 33% (31,587 acres) would be closed or excluded. Compared with the No Action Alternative, this alternative would be more beneficial to potential Kuenzler's hedgehog cactus habitat, especially those species occupying the excluded areas. However, the No Action Alternative for known gypsum wild buckwheat for renewable energy development would be more beneficial than Alternative A because of greater avoidance or exclusion areas.

Impacts from Alternative B

Under Alternative B, 93% (165 acres) of gypsum wild buckwheat habitat would be closed or excluded from geothermal, solar, and wind development, 8% (14 acres) would be open to geothermal and solar development, and 7% (12 acres) would be open to wind development. Also, 35% (33,849 acres) of potential Kuenzler's hedgehog cactus habitat would be closed or excluded from geothermal and solar development and 33% (31,587 acres) would be closed from wind development. In addition, 65% (62,869 acres) of potential Kuenzler's hedgehog cactus habitat would be open for geothermal and solar development, 22% (21,126 acres) would be open for wind development and 1% (1,198 acres) would be avoided for wind development. This alternative would open more habitat of both species to renewable energy development than the No Action Alternative, making it more likely for the adverse impacts described in Impacts from Management Common to All Alternatives to occur.

Impacts from Alternative C

Under Alternative C, 93% (163 acres) of gypsum wild buckwheat habitat would be closed or excluded from geothermal and solar development and 8% (14 acres) would be open or variance. For wind development, 69% (121 acres) would be avoided and 21% (38 acres) acres would be excluded. Also, 67% (64,481 acres) of potential Kuenzler's hedgehog cactus habitat would be managed as open for geothermal and variance for solar; 33% (32,136 acres) would be closed or excluded. For wind development within potential Kuenzler's hedgehog cactus habitat, 11% (11,054 acres) would be managed as avoid and 4% (3,672 acres) would be managed as exclude. This alternative would open more habitat of both species to renewable energy development than the No Action Alternative, making it more likely for the adverse impacts described in Impacts from Management Common to All Alternatives to occur.

Impacts from Alternative D

Under Alternative D, 22% (38 acres) of gypsum wild buckwheat habitat would be closed or excluded from geothermal, solar, and wind development and 78% (137 acres) would be open or variance. Also, 15% (14,526 acres) of potential Kuenzler's hedgehog cactus habitat would be closed or excluded for solar and geothermal, 28% (27,284) would be avoided for wind, and 24% (22,951 acres) would be open or variance. This alternative would open more habitat of both species to renewable energy development than the No Action Alternative, making it more likely for the adverse impacts described in Impacts from Management Common to All Alternatives to occur.

Impacts of Livestock Grazing Management Actions on Special Status Plants

Impacts from Management Common to All

Livestock grazing can directly affect special status plants as a result of livestock eating or trampling special status plant individuals. Other detrimental impacts from grazing could include habitat degradation from disruption of some ecosystem functions, changes to community organization, and changes to the physical characteristics of both terrestrial and aquatic habitats, ultimately leading to a reduction in population densities of special status plants (Fleischner 1994; Chaneton and Lavado 1996; Olff and Ritchie 1998). The presence of cattle can also degrade special status species' habitat because cattle disperse honey mesquite seeds far from their source, contributing to an ongoing trend of mesquite encroachment on grasslands habitat (Drewa et al. 2001). Mesquite trees grow in dense stands, which outcompete most other vegetation. Mesquite encroachment could reduce the availability of habitat for special status plants that occur in grasslands, such as Kuenzler's hedgehog cactus and Sneed's pincushion cactus.

Under all alternatives, livestock grazing would continue on an area of land specific to each alternative. Table 4-51 presents the planning area BLM-administered lands open and closed to grazing under each alternative. Long-term range monitoring studies established on 84 allotments in the planning area would continue. These studies, which collect data on livestock use, vegetation production and use, climatic patterns, and ecological condition and trend, would benefit grassland special status species by guiding livestock grazing management actions as they relate to rangeland health by informing mangers of current conditions and helping prevent overgrazing and undue habitat degradation.

Table 4-51. Livestock Grazing Management Decisions on BLM-administered Lands

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
Closed	5,226	493,120	153,583	8,115	3,594
Total	***2,091,333***	***2,091,318***	***2,091,308***	***2,091,347***	***2,091,353***

Impacts from the No Action Alternative

Under the No Action Alternative, livestock grazing would be removed from 5,226 acres of the planning area. Grazing would remain open on 2,086,107 acres of BLM-administered lands in the planning area. Approximately 350,000 AUMs would be authorized to 200 permittees, and approximately 18,000 AUMs would be made available to 62 lessees. The removal of grazing from 1,939 acres would be beneficial for special status plant species if those acres overlap known or potential habitat. The negative impacts of livestock grazing as described in Impacts from Management Common to All Alternatives would continue on all other lands open to grazing that overlap special status plant species' habitat.

Impacts from Alternative A

Under Alternative A, 493,120 acres of BLM-administered land would be closed to livestock grazing; this is nearly 225 times the acreage closed under the No Action Alternative. The closed area would include known habitat for Tharp's bluestar and gypsum wild buckwheat. In areas closed to livestock grazing, these special status plants would benefit because the negative impacts described in Impacts from Management Common to All Alternatives would no longer occur. The spread of mesquite would likely be reduced with the removal of cattle, as described in Impacts from Management Common to All Alternatives. Where feasible, grasses such as black grama may be allowed through management actions to grow sufficiently for fire to occur as a natural disturbance, promoting the persistence of grasslands in the long run and thus habitat for grassland special status plant species. The Chihuahuan Desert Rivers proposed ACEC, which encompasses 118 acres of gypsum wild buckwheat habitat, would be closed to livestock grazing. That species would benefit from the removal of the negative impacts described under Impacts from Management Common to All Alternatives. This alternative would benefit special status plant species where their known and potential habitat overlaps grazing allotments by decreasing the potential for the negative impacts described in Impacts from Management Common to All Alternatives.

Impacts from Alternative B

Under Alternative B, more than 153,583 acres of BLM-administered land would be closed to livestock grazing, which is approximately 79 times more acreage closed than under the No Action Alternative. The closures would primarily occur in the proposed Birds of Prey Grasslands ACEC, which encompasses 6,584 acres of potential Kuenzler's hedgehog cactus habitat, and the proposed Gypsum Soils ACEC, which encompasses 137 acres of known gypsum wild buckwheat habitat. This closure would lead to the same nature and comparable magnitude of beneficial impacts as described under Alternative A.

Impacts from Alternative C

Under Alternative C, 8,115 acres would be closed to livestock grazing, or approximately 4 times the acreage closed under the No Action Alternative. The locations of the area closed to grazing would not overlap any known special status plant species habitat, but may impact unknown and/or potential habitat for grassland species. The nature of impacts to special status plant species under this alternative would be the same as those described under the No Action Alternative, but would occur over a greater area.

Impacts from Alternative D

Impacts on special status plant species under Alternative D would be the same as those described for Alternative C, except that 3,594 acres would be closed to grazing. This would lead to beneficial impacts on an area approximately twice as large as under the No Action Alternative.

Impacts of Travel Management Actions on Special Status Plants

Impacts from Management Common to All Alternatives

Impacts of travel management actions on special status plants are mainly due to decisions related to OHV use. Impacts from OHV use on special status plant species are mostly associated with unrestricted cross-country travel (i.e., in areas designated as open). Potential direct and indirect, and short- and long-term, impacts could occur in all habitat types where OHV use is open (unrestricted). Impacts include short-term, adverse impacts to individuals from dust production, potential for trampling and damage by vehicles and soil disturbance, habitat fragmentation, and degradation of habitat from introduction of invasive and exotic weed species. These impacts could directly impact special status individuals and lead to a reduction in abundance. Restricting OHVs to designated or existing routes would help avoid the potential of trampling individuals, but all other impacts would occur because they are caused by the presence of OHVs. The scale of these impacts would be considerably less than in unrestricted areas, however, because they would only occur adjacent to OHV routes. Closure to OHV use would be beneficial for special status plant species that occur within the closure areas.

Table 4-52. Travel Management Decisions by Alternative (acres) on BLM-administered Lands

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Impacts from the No Action Alternative

Under the No Action Alternative 55,966 acres (2.7% of the planning area) would be closed to OHVs, 2,035,307 acres (97% of the planning area) would be OHV limited. Existing OHV closures consist of the Laguna Plata and Pope's Well areas.

Impacts from Alternative A

Under Alternative A, 52,028 acres (2.5% of the planning area) would be closed to OHVs and 2,039,299 acres (97.5% of the planning area) would be OHV limited. Compared with the No Action Alternative, the decrease in closed areas would increase negative impacts of unrestricted OHV travel on special status plants as described in Impacts from Management Common to All Alternatives for populations that are not adjacent to existing or designated routes. Populations adjacent to existing or designated routes would still be impacted by fugitive dust, habitat fragmentation, and introduction of invasive and exotic weed species.

Impacts from Alternative B

Under Alternative B, 41,936 acres (2.0% of the planning area) would be closed to OHVs and 2,049,391 acres (98.0% of the planning area) would be OHV limited. The nature of the impacts would be the same as that described for Alternative A, but the beneficial impacts of closure would decrease under this alternative, because less of the planning area would be designated as closed.

Impacts from Alternative C

Under Alternative C, 38,738 acres (1.9% of the planning area) would be closed to OHVs and 2,052,582 acres (98.1% of the planning area) would be OHV limited. The nature of the impacts would be the same as that described for Alternative A, but the beneficial impacts of closure would decrease compared to the No Action Alternative because less of the planning area would be designated as closed.

Impacts from Alternative D

Under Alternative D, 38,737 acres (1.9% of the planning area) would be closed to OHVs and 2,052,584 acres (98.1% of the planning area) would be OHV limited. The nature of the impacts would be the same as that described for Alternative A, but the beneficial impacts of closure would decrease compared to the No Action Alternative and because less of the planning area would be designated as closed.

Impacts of Special Designations Management Actions on Special Status Plants

Impacts from Management Common to All Alternatives

ACEC management decisions would generally reduce long-term impacts to the special status plant species that occur inside their boundaries. Impacts to special status plant species vary between alternatives based on the acreage of areas designated as ACECs and management of each ACEC. ACECs are designated to protect identified relevant and important values such as cultural resources, scenic qualities, and natural systems. Each ACEC is prescribed various levels of limitations on activities such as oil and gas leasing, ROWs, renewable energy development, livestock grazing, and travel. See Chapter 2 Alternatives Matrix-Special Designations, for details on ACECs by alternative. In general, ACEC designation would reduce impacts to special status plant species and habitats by limiting human activity and associated surface disturbances and thereby preserving habitat.

Seven proposed ACECs overlap the known distribution of special status plants in the planning area: Birds of Prey Grasslands, Chihuahuan Desert Rivers, Gypsum Soils, Lonesome Ridge, Serpentine Bends, Seven Rivers Hills, and Six Shooter Canyon. Other unknown and/or currently undefined special status plant habitats may occur in other proposed ACECs. For this reason, the total amount proposed under each alternative, as well as acres of known special status plant habitat, are reported for each alternative. Table 4-53 lists the total amount of area and known special status plant species habitats proposed for ACEC designation by alternative.

Table 4-53. Acres of ACEC Designations by Alternative on BLM-administered Lands

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
13,435	495,042	561,433	98,562	28,894

Decisions to designate RNAs, WSAs, and WSRs would also benefit the special status plants that inhabit each particular area. WSAs are established to provide for the protection of wilderness character and for the use and enjoyment of visitors in a manner that leaves the areas unimpaired for future use. By definition, no surface disturbance, permanent new development, or rights would occur in these areas. This is because these designations generally reduce long-term impacts to vegetation that occurs within their boundaries. ROW would be allowed in the WSAs; the lands would be closed to oil, gas, and mineral leasing.

Impacts from the No Action Alternative

Under the No Action Alternative, no new ACECs would be designated, and currently designated ACECs, totaling 13,435 acres, would continue to be managed as such. Special status plant species' habitats are not known in areas currently managed as ACECs, but other unknown and undefined species may occur there. This alternative would not provide any of the beneficial impacts associated with ACEC designation, as described in Impacts from Management Common to All Alternatives, for known special status species' plant habitat, but it may provide protection for species that occur on the currently designated ACECs.

Impacts from Alternative A

Under Alternative A, 495,042 acres of the planning area would be managed as ACECs. Birds of Prey Grasslands, Serpentine Bends, and Chihuahuan Desert Rivers would be designated as ACECs, with benefits to the Kuenzler's hedgehog cactus, Lee's pincushion cactus, and gypsum wild buckwheat. This alternative would provide more ACEC protections described in Impacts from Management Common to All Alternatives on more known and potential habitat than the No Action Alternative.

Impacts from Alternative B

Under Alternative B, 561,433 acres of the planning area would be managed as ACECs. Birds of Prey Grasslands, Gypsum Soils, Serpentine Bends, and Seven Rivers Hills would all be designated as ACECs, with benefits to the gypsum wild buckwheat, Kuenzler's hedgehog cactus, and Lee's pincushion cactus. This alternative would provide the ACEC protections described in Impacts from Management Common to All Alternatives on more known and potential habitat than all other alternatives, and would provide the most beneficial impacts for special status plant species.

Impacts from Alternative C

Under Alternative C, 98,562 acres of the planning area would be managed as ACECs. Gypsum Soils, Serpentine Bends, and Seven Rivers Hills would all be designated as ACECs, with benefits to the gypsum wild buckwheat, and Lee's pincushion buckwheat. This alternative would provide more ACEC protections described in Impacts from Management Common to All Alternatives on more known and potential habitat than the No Action Alternative.

Impacts from Alternative D

Under Alternative D, 28,894 acres of the planning area would be managed as ACECs. Seven Rivers Hill and Serpentine Bends would both be designated as ACECs, with benefits to the gypsum wild buckwheat and Lee's pincushion cactus. This alternative would provide the fewest ACEC protections described in Impacts from Management Common to All Alternatives, compared with all action alternatives. It would therefore provide fewer beneficial impacts for special status plant species. However, this alternative would still provide more ACEC protections than the No Action Alternative.

4.2.5.2 Special Status Fish

Special status fish species are those that occur on USFWS, NMDGF, and/or BLM lists of threatened, endangered, and otherwise sensitive species. Existing conditions concerning fish across the planning area are described in Chapter 3. The fish species analyzed in this section are described in detail in Section 3.2.6.3. Habitat locations for fish species consist of CFO lakes, rivers, and streams, as shown on Map 3-3.

4.2.5.2.1 Analysis Methods

Indicators

In general, all protective stipulations that limit water pumping and ground-disturbing activities, particularly those associated with oil and gas development, would minimize adverse impacts on special status fish species. The indicator used to assess impacts between alternatives in this analysis is acres of riparian habitat directly impacted.

Methods and Assumptions

Impacts to special status fish from management actions of the following resources, resources uses, and special designations are analyzed in detail: minerals, land use authorizations, recreation, livestock grazing, travel management, visual resource management, and special designations.

Impacts from proposed management actions for air quality, water resources, riparian, vegetative communities, fish and wildlife, special status species, wildland fire and fuels management, karst resources, paleontological resources, and cultural resources actions are not analyzed in detail because the management actions did not vary measurably between alternatives and/or there would be no or negligible impacts to fish as a result of those management actions.

Assumptions used for the impact analysis include the following:

- Those proposed management actions across the planning area that limit ground-disturbing activities would minimize habitat degradation for special status fish species because impacts associated with ground disturbance such as increased sedimentation and turbidity, alterations in water quality, and loss of streamside vegetation would not occur.
- Where special status aquatic species and native non-game fish coexist, management actions that would reduce or improve overall habitat quality for non-game fish would also reduce or improve overall habitat quality for special status fish.
- The health of special status fish is directly related to the overall health and functional capabilities of aquatic, riparian, and wetland resources. Those proposed actions that would benefit riparian and other aquatic habitats—e.g., managing water-pumping activities and prohibiting livestock grazing and other surface-disturbing activities—and contribute to meeting PFC would also indirectly benefit special status fish species by maintaining water quantity and quality, and limiting sedimentation and turbidity impacts that can negatively affect aquatic species and the habitats they depend on.
- Inherent to the "special status" designation, many of these species are vulnerable to extinction by natural processes or human disturbance (Stephens and Sutherland 1999). The analysis in this section is largely based on the concept that increases in population size, occupied habitat, and available habitat are beneficial impacts on special status plants species. This is because larger population sizes lead to increased genetic variability, which may increase a species' ability to respond to changing environmental conditions, decrease the risk of inbreeding depression, and persist after random and/or large disturbance events—all of which can decrease fertility and survival rates. Due to the programmatic nature of this document, the potential for extinction resulting from specific management actions cannot be assessed.

4.2.5.2.2 Direct and Indirect Impacts

Any actions that remove, degrade, or fragment aquatic habitats are considered adverse. Beneficial impacts include actions that conserve or improve aquatic habitats, including surrounding vegetation. Proper management of soil, water, and vegetative resources, particularly in the riparian zones of watersheds, would reduce disturbances to habitat and result in beneficial impacts to special status fish. Direct impacts to fish could result from the loss of habitats or key habitat features, such as spawning or feeding areas, or from the immediate loss of life.

The following impacts would have the potential to affect the survivability and fecundity of fish species, and are considered for this analysis:

- Sediment and turbidity—Sediment loading resulting from increased erosion, and turbidity in waters containing sediment-intolerant fish species can reduce the availability of suitable spawning and rearing habitats, impair sources of food for fish, contribute to loss of recruitment, and, in some cases, cause direct physical harm and stress.
- Habitat alteration—Changes in water quantity (instream flow) and habitat that make it nonfunctional for select species, or more conducive to competitive species.
- Loss or reduction of streamside vegetation/cover—Increased temperatures, stress, reduced
- productivity, and disruptions to food resources.
- Water quality alteration—Actions that alter important water quality parameters, including pH, dissolved oxygen, temperature, hardness, alkalinity/salinity, and turbidity.

Impacts of Livestock Grazing Actions on Special Status Fish

The removal of livestock from riparian habitats would provide beneficial impacts to special status fish because erosion, sedimentation, trampling of vegetation, and degradation of water quality—all of which are associated with livestock grazing (Belsky et al. 1999)—would be minimized. Fish would benefit from greater protection of these important habitat components.

Specific riparian areas may be open or closed to livestock grazing, depending on the alternative. Table 4-54 depicts areas associated with particular river systems across the planning area and livestock grazing management actions across the alternatives.

Table 4-54. Riparian Area Management Decisions by Alternative

Riparian/River Areas	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Pecos River	Open to grazing with the exception of RNA of the Pecos River Canyons/Complex ACEC, bluntnose shiner habitat, and Red Bluff Area	Number of livestock and season of use to be established on allotment basis to ensure adequate growing season rest	Same as Alternative A	Same as Alternative A	Same as Alternative A
Black River Management Area	Closed to grazing	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Small portion along Black River (outside of Black River Management Area)	Open to livestock grazing	Removal of livestock grazing within 656 feet of the river bank on either side	Same as Alternative A	Same as No Action Alternative	Same as No Action Alternative
Delaware River (both sides of U.S. 285)	Livestock grazing not permitted during the active season (April–October), but would be allowed during the dormant season use (November–March)	Same as No Action Alternative	Removal of livestock grazing from seasonal pastures	Removal of livestock grazing from all riparian pastures	Same as No Action Alternative
Riparian Springs	The following springs would be closed to grazing: Bogle Flat, Preservation, Cottonwood, Owl, Ben Slaughter, and Blue Spring	Riparian springs and their associated riparian zones would be closed to grazing	Same as Alternative A	Same as Alternative A	Same as Alternative A

Impacts from Management Common to All

Under all alternatives, the Black River Management Area would be closed to grazing. This proposed decision would beneficially impact special status fish through minimizing the loss of streamside vegetation cover and minimizing changes in water quality that can result from livestock grazing.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, the livestock grazing along the Pecos River, number of livestock and season of use, would be established on an allotment basis to ensure adequate growing season rest. This would indirectly benefit special status fish by minimizing the degree of negative impacts associated with livestock grazing, as previously described. The Pecos Bluntnose Shiner Habitat ACEC (200 acres) would be designated and closed to grazing under all action alternatives. This would directly benefit the Pecos bluntnose shiner and other special status fish that may utilize habitat within the ACEC.

Impacts from the No Action Alternative

Under the No Action Alternative, current livestock grazing management prescriptions would remain in place and include keeping 2,086,107 acres of unallotted tracts open to livestock grazing. This alternative would also close 5,226 acres to livestock grazing. Adverse impacts to special status fish from increased erosion, sedimentation, water depletion, and loss of streamside vegetative cover would be minimized through greater water quality protection within these sensitive riparian habitats and fragile watersheds (see the Direct and Indirect Impacts section above for further discussion on how these components impact fish).

Impacts from Alternative A

Under Alternative A, 493,120 acres would be closed to livestock grazing. This includes 5,000 acres of unallotted tracts that would be closed to grazing to protect wildlife vegetation and watershed health. Adverse impacts to special status fish under Alternative A would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts from Alternative B

Under Alternative B, 153,583 acres would be closed to livestock grazing, which includes 5,000 acres of unallotted tracts. Adverse impacts to special status fish under Alternative B would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts from Alternative C

Under Alternative C, 8,115 acres would be closed to livestock. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Adverse impacts to special status fish under Alternative C would be less than those impacts described under the No Action Alternative because more acres would be closed to livestock grazing under this alternative.

Impacts from Alternative D

Under Alternative D, 3,594 acres would be closed to livestock grazing. As with the No Action Alternative, 5,000 acres of unallotted tracts would remain open to livestock grazing. Adverse impacts to special status fish under Alternative D would be greater than those impacts described under the No Action Alternative because less acres would be closed to livestock grazing under this alternative.

Impacts of Recreation Actions on Special Status Fish

Recreation management can impact aquatic species and their habitats in many ways. Human activity along or within streams and rivers and around or within ponds, lakes, and reservoirs can result in habitat alteration, reduced or loss of riparian vegetation cover, increased sedimentation and turbidity, and water contamination.

Acreages across the planning area designated as SRMAs or ERMAs would not directly or indirectly impact special status fish or their habitats. Recreational use of these areas would not be expected to increase or decrease as a result of designation and would therefore not affect vegetation cover around water bodies, sedimentation, turbidity, or overall water quality.

Impacts from Management Common to All

RAMPs would be prepared for all designated SRMAs under management common to all. The purpose of SRMAs is to focus management, better direct people to opportunities, and coordinate recreation activities with other multiple uses in the area. The RAMPs that would be prepared for the designated SRMAs identify specific recreation implementation actions, including permitting or use allocation decisions. As part of a RAMP preparation, other resources and resource use issues are considered, which generally provides for mitigation of impacts due to recreation activities proposed under SRMAs. Given this, there are unlikely to be any adverse impacts from the development of RAMPs to special status fish.

Under management common to all, all activities would adhere to BLM New Mexico supplementary rules that provide for several safety and procedural parameters for activities on public lands. These rules include no construction of pit toilets lasting more than 14 days within 100 feet of any permanent water source, no fireworks, and no cutting or removal of woody materials. All these rules would reduce or prevent adverse impacts to fish from water contamination and sediment loading. In addition, the Pecos River Corridor (8,348 acres) SRMA would be closed to all surface-disturbing activities, which would minimize adverse impacts such as those described above. These management actions would provide beneficial impacts to special status fish such as the Pecos bluntnose shiner and other species that occur in waterways adjacent to recreation areas.

Impacts from Management Common to All Action Alternatives

All action alternatives in the planning area would maintain water quality in natural water sources by prohibiting camping within 900 feet of these areas (excluding the Pecos River). This would benefit special status fish by reducing disturbance near riparian areas, maintaining or improving water quality, reducing sedimentation, and contributing to the overall health of riparian ecosystems near recreational areas.

Impacts of Travel Management Actions on Special Status Fish

Travel management may adversely impact special status fish and their habitats in various ways. The presence of trails and roads within watersheds containing fish and other aquatic species can cause habitat alteration, loss or reduction of streamside vegetation cover, increased sedimentation and turbidity, and water quality alteration. Roads and trails provide means of water conveyance, which accelerates flow velocities and increases erosion and off-site soil movement and ultimately sedimentation and turbidity. These routes also compact soils, which reduces water absorption and infiltration rates and increase the peaks of runoff flows. Where motorized and, in some cases, mechanized use are high and/or increasing, erosion potential is increased. These impacts are amplified where user-created routes and OHV use is occurring or increasing. In areas where OHV use is occurring or would increase, impacts such as sedimentation and turbidity, soil compaction, loss of riparian vegetation and cover, habitat alteration, and water quality changes would be long term and chronic.

Impacts from Management Common to All Action Alternatives

Under management common to all action alternatives, roads would be constructed and maintained per the BLM's *Surface Operating Standards and Guidelines for Oil and Gas Development – The Gold Book* (BLM 2007a). Additionally, all surfacing material on oil and gas roads would be removed at the time of abandonment. Both these management actions would impart indirect beneficial impacts to special status fish by minimizing the potential for erosion, runoff, and contamination of streams, rivers, and other water bodies that provide habitat for fish.

Impacts from the No Action Alternative

Under the No Action Alternative, 0 acres in the planning area would remain open to OHV use, approximately 2,035,307 acres would be OHV limited, and 55,966 acres (2.7%) would be closed to travel). In general, as road density increases, adverse impacts to riparian and other aquatic habitats potentially increase as well. Special status fish and the habitat components upon which they depend would be negatively affected by the greater potential of adverse impacts to watershed health and subsequent water quality.

Impacts from Alternative A

Under Alternative A, 0 acres would be open to OHV use, approximately 2,039,299 acres would be OHV limited, and 52,028 acres would be closed to travel. Qualitatively, this would have the same adverse impacts to special status fish as the No Action Alternative. The magnitude of impacts, however, would be greater due to a slight decrease (0.2%) in number of acres closed to travel relative to the No Action Alternative.

Impacts from Alternative B

Under Alternative B, 0 acres would be open to OHV use, approximately 2,049,391 acres would be OHV limited, and 41,936 acres would be closed to travel. Qualitatively, this would have the same adverse impacts to special status fish as the No Action Alternative. The magnitude of impacts, however, would be greater due to a 0.7% decrease in number of acres closed to travel relative to the No Action Alternative.

Impacts from Alternative C

Under Alternative C, 0 acres would be open to OHV use, approximately 2,052,582 acres would be OHV limited, and 38,738 acres would be closed to travel. Qualitatively, this would have the same adverse impacts to special status fish as the No Action Alternative. The magnitude of impacts, however, would be greater due to a 0.8% decrease in number of acres closed to travel relative to the No Action Alternative.

Impacts from Alternative D

Under Alternative D, 0 acres would be open to OHV use, approximately 2,052,584 acres would be OHV limited, and 38,737 acres would be closed to travel. Qualitatively, this would have the same adverse impacts to special status fish as the No Action Alternative. The magnitude of impacts, however, would be greater due to a 0.8% decrease in number of acres closed to travel relative to the No Action Alternative.

Impacts of Land Use Authorizations Actions on Special Status Fish

The authorization of ROWs for utility and communication infrastructure (among others) could have direct, long-term adverse impacts on special status fish as a result of fragmentation and erosion during construction and maintenance activities. These actions could contribute to an increase in sedimentation and turbidity, and reduce overall riparian habitat condition and water quality. Management decisions to avoid or exclude certain areas from ROWs would have beneficial impacts to special status fish (Table 4-55).

Table 4-55. Avoidance and Exclusion Areas for Land Use Authorizations (acres) by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,051,927	98,544	757,380	1,610,692	1,749,782
Avoidance	30,965	629,149	413,654	313,619	270,360
Exclusion	7,056	662,038	918,701	165,378	69,540

Impacts from the No Action Alternative

Under the No Action Alternative, six ROW corridors have already been designated by the BLM as preferred locations for all new major utility and transportation facility alignments. A total of 30,965 acres would continue to be designated as avoidance areas and 7,056 acres (all WSAs) would continue to be designated as exclusion areas. These designations would benefit special status fish by minimizing ROW construction and associated fragmentation and disturbance near or within these important habitat areas. Under the No Action Alternative, 2,051,927 acres would be open to ROWs.

Impacts from Alternative A

Under Alternative A, 629,149 acres would be designated as avoidance areas and 662,038 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative A would provide fewer adverse impacts to special status fish through protection of important habitat components. Under the Alternative A, 98,544 acres would be open to ROWs.

Impacts from Alternative B

Under Alternative B, 413,654 acres would be designated as avoidance areas and 918,701 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative B would provide fewer adverse impacts to special status fish through protection of important habitat components. Under Alternative B, 757,380 acres would be open to ROWs.

Impacts from Alternative C

Under Alternative C, 313,619 acres would be designated as avoidance areas and 165,378 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative C would provide fewer adverse impacts to special status fish through protection of important habitat components. Under Alternative C, 1,610,692 acres would be open to ROWs.

Impacts from Alternative D

Under Alternative D, 270,360 acres would be designated as avoidance areas and 69,540 acres would be designated as exclusion areas for ROWs. Compared to the No Action Alternative, Alternative D would provide fewer adverse impacts to special status fish through protection of important habitat components. Under Alternative D, 1,749,782 acres would be open to ROWs.

Impacts of Mineral Resource Actions on Special Status Fish

The majority of the planning area would be available for leasable, salable, and locatable mineral development. Mineral development activities would be subject to site-specific NEPA analysis, stipulations, COAs, and other authorities as described in Chapter 3, 3.3.1. In general, surface disturbance related to mineral extraction could potentially reduce water quality and riparian condition (PFC), causing both short- and long-term impacts to special status fish. Other impacts from minerals development could potentially include water depletions and increased sedimentation and turbidity. If adverse impacts to special status fish were identified during site-specific NEPA analysis, the BLM would consult with the USFWS prior to approving the proposed project.

Of primary concern are activities that result in ground disturbance and the removal of native vegetation for the construction of well pads, roads, pipelines, compressor and relay stations, settling ponds, and various assorted infrastructure. Collectively, these activities could result in the off-site movement of soils and increase sediment loading and turbidity into nearby water bodies. In addition, such activities provide opportunities for invasive vegetation and noxious, non-native species to take hold. This reduces watershed health, and results in poor soil retention, increased runoff, and poor water infiltration and absorption.

An increase in the number and density of roads would be a concern because they are long-term chronic point sources of sediment input, contamination from vehicles, and serve as water collection and conveyance corridors to live streams and ephemeral drainages that ultimately feed live streams. Impacts are amplified and more acute in areas where natural gas development is occurring in small discrete watersheds. Generally, where proper and timely reclamation is occurring at well pad and pipeline sites, and where proper road construction and maintenance is occurring, impacts from off-site soil movement and sediment and turbidity would be minimized.

The acreage of land open to minerals extraction (for leasable, salable, and locatable minerals) varies across the action alternatives and is discussed below. Because leasable mineral development is the most common and prolific type of mineral development in the planning area, acres of BLM-administered lands subject to leasable mineral decisions are used to define impacts to special status fish in this section.

Impacts from the No Action Alternative

The greater the numbers of acres open to mineral development, the greater the potential for impacts to special status fish, as watershed health and overall riparian condition would become more vulnerable to degradation. Under the No Action Alternative, 1,598,870 acres of BLM lands would be open to leasable mineral development with standard terms and conditions. A combined 1,011,012 acres would be open with either moderate constraints (CSU) or major constraints (NSO). In all, 174,391 acres would be closed to leasable mineral development.

Impacts from Alternative A

Alternative A would open 1,142,802 acres of BLM lands in the planning area to leasable mineral development with standard terms and conditions, while a combined 880,043 acres would be managed as CSU or NSO. In all, 761,404 acres would be closed to leasable mineral development. Alternative A would provide fewer open areas to leasable mineral development than the No Action Alternative. Additionally, more acres would be closed to leasable mineral development than under the No Action Alternative, thereby reducing the amount of surface disturbance, which would reduce sedimentation, potentially improve water quality, and reduce indirect impacts to riparian areas.

Impacts from Alternative B

Alternative B would open 1,089,481 acres of BLM lands within the planning area to leasable mineral development with standard terms and conditions while a combined 611,772 acres would be managed as CSU or NSO. In all, 1,082,972 acres would be closed to leasable mineral development. Alternative B would provide fewer open areas to leasable mineral development than the No Action Alternative. Additionally, more acres would be closed to leasable mineral development than under the No Action Alternative, thereby reducing the amount of surface disturbance, which would reduce sedimentation, potentially improve water quality, and reduce indirect impacts to riparian areas.

Impacts from Alternative C

Alternative C would open 1,750,774 acres of BLM lands within the planning area to leasable mineral development with standard terms and conditions, while a combined 944,782 acres would be managed as CSU or NSO. In all, 88,502 acres would be closed to leasable mineral development. Alternative C would provide more open areas to leasable mineral development than the No Action Alternative. Additionally, less acres would be closed to leasable mineral development than under the No Action Alternative, thereby increasing the amount of surface disturbance, which would potentially result in greater sedimentation, impact water quality, and increase indirect impacts to riparian areas.

Impacts from Alternative D

Alternative D would open 1,997,681 acres of BLM lands within the planning area to leasable mineral development, while a combined 701,776 acres would be managed as CSU or NSO. In all, 84,687 acres would be closed to leasable mineral development. Alternative D would provide more open areas to leasable mineral development than the No Action Alternative. Additionally, less acres would be closed to leasable mineral development than under the No Action Alternative, thereby increasing the amount of surface disturbance, which would potentially result in greater sedimentation, impact water quality, and increase indirect impacts to riparian areas.

Impacts of Special Designation Actions on Special Status Fish

Special designation areas such as ACECs, WSRs, and WSAs would generally have long-term positive impacts on special status fish that occur within their boundaries by limiting or preventing ground disturbance, human activities, and associated habitat degradation and fragmentation. Management goals within special designations would include the protection of riparian ecosystems and other water bodies, which would benefit special status fish as water quality and other food and habitat components are enhanced. Adverse impacts to special status fish, such as habitat and water quality alterations, reduction in streamside vegetation, and excessive sedimentation and turbidity within these designations would be minimized.

Areas of Critical Environmental Concern

Impacts from the No Action Alternative

Under the No Action Alternative, approximately 13,435 acres would continue to be designated as ACECs. Adverse impacts, such as those described above, to special status fish and associated habitat components would be minimized within the 13,435 acres.

Impacts from Alternative A

Under Alternative A, 495,042 acres would be designated as ACECs. This alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the 481,607-acre increase in land designated as ACECs. Approximately 200 acres would be designated as the Pecos Bluntnose Shiner Habitat ACEC, which would beneficially impact the Pecos bluntnose shiner and other special status fish species that use the same habitat, such as Rio Grande shiner (*Notropis jemezanus*), gray redhorse (*Moxostoma congestum*), and blue sucker (*Cycleptus elongatus*).

Impacts from Alternative B

Under Alternative B, 561,441 acres would be designated as ACECs. This alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the 547,998-acre increase in land designated as ACECs. The Pecos Bluntnose Shiner Habitat ACEC would be designated and managed as described under Alternative A.

Impacts from Alternative C

Under Alternative C, 98,562 acres would be designated as ACECs. This alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the 85,127-acre increase in land designated as ACECs. The

Pecos Bluntnose Shiner Habitat ACEC would be designated and managed as open with major constraints (NSO) for leasable mineral development. This decision would have the same impact to special status fish as described under Alternative A.

Impacts from Alternative D

Under Alternative D, 28,894 acres would be designated as ACECs. This alternative would have the same beneficial impacts as the No Action Alternative; however, the magnitude of these impacts would be greater than under the No Action Alternative due to the 15,459-acre increase in land designated as ACECs. The Pecos Bluntnose Shiner Habitat ACEC would be designated and managed as open with moderate constraints (CSU) for leasable mineral development. This decision would provide less protection to the special status fish and their associated habitats than Alternatives A, B, and C because some surface disturbance within the ACEC would be allowed to occur.

Wild and Scenic Rivers

Impacts from Management Common to All Action Alternatives

Under all action alternatives, 3.7 miles of the Black River would be recommended as suitable for inclusion in the NWSRS. Management prescriptions for Black River WSR would vary across alternatives and are described below. Designation of WSR segments would beneficially impact special status fish, including big scale logperch (*Percina macrolepida*), blue sucker, and gray redhorse, because it would prioritize resource management for the protection of the river.

Impacts from the No Action Alternative

Under the No Action Alternative, the Black and Delaware Rivers would not be managed as part of the NSRS but would be managed to protect their eligibility until suitability determinations are made in the RMP. The Black River would be managed with the following prescriptions: designation as VRM Class III, closed to salable development, recommended for withdrawal from locatable mineral development, and open with major constraints for leasable development. All ROW construction would continue to be designated under “avoidance” within WSR areas and all renewable energy development would not be allowed. The Delaware River would be managed with various prescriptions, such as classifying certain segments of the river under VRM Class II and IV, closing or excluding areas adjacent to the river to renewables development, managing as NSO for leasable mineral development, closing to salable development, recommending for withdrawal from locatable development and designating as ROW avoidance area. Potential adverse impacts to special status fish, including bigscale logperch, blue sucker, and gray redhorse, would include habitat and water quality alterations, reduction in streamside vegetation, and excessive sedimentation and turbidity.

Impacts from Alternative A

Under Alternative A, one segment (8.22 miles) of the Delaware River would be recommended as suitable for WSR designation. Management prescriptions under WSR designation would include management as VRM Class II; travel limited to designed routes, closed, or withdrawn from mineral development; and travel excluded from ROW corridors and renewable energy development. The designation and management prescriptions would benefit the Mexican tetra, which is known to occur in the Delaware River. The Black River WSR would be managed with the same prescriptions. These management prescriptions provide a slightly greater degree of protection to special status fish, including bigscale logperch, gray redhorse, and blue sucker, and their habitats compared to the No Action Alternative because they would be managed as exclusion areas for ROWs and would be managed under a more stringent VRM class.

Impacts from Alternative B

Under Alternative B, the Black River would be recommended as suitable for inclusion in the WSR system and would be managed as described under Alternative A. The Delaware River would not be recommended as suitable for inclusion in the WSR system; however, management prescriptions would be more protective of riparian habitat than as described under the No Action Alternative. Adverse impacts to special status fish and their habitats would be less than those described under the No Action Alternative.

Impacts from Alternative C

Under Alternative C, the Black River would be recommended as suitable for inclusion in the WSR system, and would be managed as described under Alternative A. The Delaware River would not be recommended as suitable for inclusion in the WSR system, and would be managed as described under Alternative B. Adverse impacts to special status fish would be less than those described under the No Action Alternative.

Impacts from Alternative D

Under Alternative D, the Black River would be recommended as suitable for inclusion in the WSR system, and would be managed as described under Alternative A; however, the area would be managed as open with major constraints (NSO) for leasable development. The Delaware River would not be recommended as suitable for inclusion in the WSR system, and would be managed as described under Alternative B. Adverse impacts to special status fish and their habitats would be less than those described under the No Action Alternative.

Wilderness Study Areas

Impacts from Management Common to All

Under all alternatives, 7,086 acres would remain under WSA designation. Management prescriptions under WSA designation include closure to mineral development leasing. This would minimize potential adverse impacts to special status fish resources associated with ground disturbances such as increased sedimentation and erosion, increased turbidity, alterations in habitat and water quality, and water depletions.

Impacts of Visual Resources Management Actions on Special Status Fish

VRM class designations have specific management objectives that, depending on the class designated, could beneficially impact special status fish and their habitats, especially where VRM Class I and II areas are located adjacent to the Pecos, Black, and Delaware Rivers, where special status fish are known to occur. The objectives defined for VRM Classes I and II include the preservation or retention of the existing character of the landscape and would therefore minimize and at times prohibit surface-disturbing activities. Those impacts to fish resources associated with mineral development, ROW construction and maintenance, and other land use authorizations and road and trail construction would be minimized within these VRM Class I and II designations. The number of acres designated as VRM Class I and II varies across the alternatives (Table 4-56).

Table 4-56. Visual Resource Management Decisions (acres) by Alternative

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***50,671***	***273,710***	***357,802***	***67,962***	***48,263***

Impacts from the No Action Alternative

Under the No Action Alternative, 50,671 acres would be designated under either VRM Class I or II (see Table 4-56). Special status fish and their habitats would benefit from additional management prescriptions that would prohibit or minimize ground-disturbing activities within these designated acres. Various impacts associated with ground-disturbing activities include habitat alteration, loss or reduction in streamside vegetation cover, water quality alteration, water depletions, and increased sediment loading and turbidity.

Impacts from Alternative A

Under Alternative A, 273,710 acres would be designated as either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be much greater under this alternative because a larger number of acres would be under the VRM Class I and II designation.

Impacts from Alternative B

Under Alternative B, 357,802 acres would be designated as either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative because a larger number of acres would be under the VRM Class I and II designation.

Impacts from Alternative C

Under Alternative C, 67,962 acres would be designated as either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative because a larger number of acres would be under the VRM Class I and II designation.

Impacts from Alternative D

Under Alternative D, 48,263 acres would be designated under either VRM Class I or II. Qualitatively, the impacts would be the same as those under the No Action Alternative; however, the magnitude of beneficial impact would be greater under this alternative because a larger number of acres would be under the VRM Class I and II designation.

4.2.5.3 Special Status Wildlife

Special status wildlife species are those that occur on USFWS, NMDGF, and/or BLM lists of threatened and endangered species, and otherwise protected by the BLM by conservation agreements. The special status wildlife species analyzed in this section are described in detail in Section 3.2.6.4, Special Status Wildlife. Locations of known special status species habitat are displayed on Map 3-9 (Aplomado Falcon Habitat, including aplomado falcon grasslands habitat and aplomado falcon grasslands boundaries level 1, 2, and 3 habitats, and Lesser Prairie Chicken Habitat) and Map 3-10 (Dune Sagebrush Lizard Habitat).

4.2.5.3.1 Analysis Methods

Indicators

Acres of special status wildlife habitat overlapping areas subject to management actions under the alternatives are used for quantifying impacts in the analysis. Known acres of LPC habitat, including suitable LPC habitat, LPC isolated population area, and LPC timing restrictions area; aplomado falcon habitat, including aplomado falcon grasslands habitat and aplomado falcon grasslands boundary levels 1, 2, and 3 habitats; and DSL habitats were used in the analysis. Impacts to all other species are discussed in terms of the vegetative communities impacted, as described in Section 3.2.6.2, Special Status Plants.

Methods and Assumptions

Impacts to special status wildlife from management actions of the following resources, resource uses, and special designations are analyzed in detail: riparian, fish and wildlife, wildland fire and fuels management, lands with wilderness characteristics, visual resources, minerals, land use authorizations, renewable energy, livestock grazing, travel management, and special designations. Impacts from cave and karst, such as recreation within cave and karst features, to special status wildlife species are not analyzed in detail in this section; however, impacts and mitigation to any bat species, including special status bat species, is captured in Appendix C. Impacts from soil and water, riparian, vegetative communities, special status species, cultural resources, paleontological resources, land tenure, air resources and backcountry byways are not analyzed in detail. This is because there would be no or negligible impacts to special status wildlife as a result of those management actions because special status wildlife habitat would not be measurably altered and individuals would not be impacted. Management actions related to tribal rights and interests, social and economic conditions, and public safety do not authorize, contemplate, or otherwise intersect with surface-disturbing activities or the mitigation thereof, so these decisions also do not impact special status wildlife.

The assumptions used for this analysis are identical to those described for special status plants. Also, some of the analysis with regards to special status wildlife refers to Section 4.2.5.1, Special Status Plants. This is because the assumptions and analysis describe impacts based on basic biological, ecological, and demographic concepts that apply to all living things and are applicable to both plants and wildlife.

4.2.5.3.2 Direct and Indirect Impacts

Impacts of Fish and Wildlife Management Actions on Special Status Wildlife

Impacts from the No Action Alternative, Alternative C, and Alternative D

Under the No Action Alternative, Alternative C, and Alternative D, the Birds of Prey Grassland would not be managed as an ACEC, but would be managed with standard stipulations for mineral leasing, not withdrawn from locatable minerals, open to salable minerals and renewable energy development, and open to OHV use and grazing. The negative impacts associated with energy development, OHV use, and grazing (as discussed in Impacts from Minerals Management Actions on Special Status Wildlife, Impacts from Travel Management Actions on Special Status Wildlife, and Impacts from Livestock Grazing Actions on Special Status Wildlife) would continue to impact the species using this area; in particular, the aplomado falcon and special status bat species because this area contains suitable habitat for these species.

Impacts from Alternatives A and B

Under Alternative A, 349,355 acres of the planning area would be designated and managed as the Birds of Prey Grassland ACEC. Management actions would be prescribed for this ACEC that would focus on reclaiming and restoring grasslands habitat, including reclaiming abandoned well pads, prescribing NSO for minerals leasing, exclusion of wind and solar development, restricting vehicles to designated routes, and avoidance of grassland bird nests. In addition to the falcon, these actions would be beneficial for all grassland special status wildlife because localized habitat fragmentation would be prevented, thereby maintaining habitat connectivity. Also, the negative impacts of surface-disturbing activities, such as increased potential for mortality through crushing, habitat loss and degradation, and human noise and activity, would be avoided. Grassland birds, such as aplomado falcon and Sprague's pipit (*Anthus spragueii*), would benefit because nests would not be disturbed, which would increase the potential for nests to be productive and for population abundance to be maintained at current levels or increase.

Impacts of Special Status Species Management Actions on Special Status Wildlife

Impacts from Management Common to All

Under all alternatives, oil and gas activities including 3-D geophysical exploration and drilling would not be allowed in occupied LPC habitat during the period from March 1 through June 15 annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, geophysical exploration other than 3-D operations, and pipeline, road, and well pad construction, would be allowed except between 3:00 a.m. and 9:00 a.m. The 3:00 a.m. to 9:00 a.m. restriction would not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling would be allowed within up to 656 feet of lek locations known at the time of permitting. Normal vehicle use on existing roads would not be restricted. Exhaust noise from pump jack engines would be muffled or otherwise controlled so as not to exceed 49 decibel (dB) measured at 30 feet from the source of the noise. These stipulations would mitigate the disruption of LPC mating and nesting by activities associated with energy exploration and development.

Impacts of Wildland Fire and Fuel Management Actions on Special Status Wildlife

Impacts from Management Common to All

Under all alternatives, wildland fire would be used to protect, maintain, and enhance resources. When possible, fire would be allowed to function in its natural ecological role. It would also be used to reduce hazardous fuels with the goal of restoring ecosystems and protecting other natural resources. Wildland fire can be both beneficial and harmful to special status animal populations. Historic fire suppression has led to conditions in many fire-adapted areas that are overgrown and in need of fire to return it to its natural state. Wildland fire in these areas would help restore the ecosystem to a more typical state, potentially

making the habitat more suitable for use and colonization by special status wildlife and potentially supporting range expansions in the long term. In the short term, burned-over landscapes would be unusable by wildlife, displacing them into other habitats until the burned area recovered. Additionally, individuals could be killed in the fire, leading to a short-term reduction in population abundance. Special status wildlife is inherently vulnerable to population declines from large-scale disturbance, such as wildfire, due to the limited amount of available suitable habitat and/or already small population sizes. Because of this, large-scale wildfire could be detrimental to special status animal populations. Exact impacts, whether beneficial or harmful, would depend on the location and nature of each individual fire.

Impacts of Lands with Wilderness Characteristics Management Actions on Special Status Wildlife

Impacts from Management Common to All Action Alternatives

The lands with wilderness characteristics alternatives consist of differing amounts of acres managed to maintain those characteristics (Table 4-57). Management actions on lands with wilderness characteristics would include recommended withdrawal from mineral entry, closing to leasing or NSO, ROW exclusion, and closure or limited motor vehicle use. Exact impacts of each of these actions are described in detail in Impacts of Mineral Leasing Management Actions on Special Status Wildlife, Impacts of Land Use Authorizations Management Actions on Special Status Wildlife, and Impacts of Travel Management Actions on Special Status Wildlife, respectively, but because of the emphasis placed on naturalness, solitude, and primitive/unconfined recreation, managing lands as lands with wilderness characteristics is generally beneficial for special status wildlife.

Table 4-57. Acres of Special Status Wildlife Habitat That Would Be Managed as Lands with Wilderness Characteristics under Each Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Aplomado falcon habitat (acres) within lands with wilderness characteristics	0	0	0	0	0
Total area managed as lands with wilderness characteristics (acres)	0	66,666	47,611	35,715	4,348

Impacts from the No Action Alternative

Under the No Action Alternative, no BLM-administered lands would be managed as lands with wilderness characteristics. Management of all lands would continue under current conditions, with a mixture of minerals leasing, travel management, and land use authorizations. Therefore, there would be no beneficial impacts to special status wildlife from lands with wilderness characteristics management under this alternative.

Impacts from Alternative A

Under Alternative A, a total of 66,666 acres including 0 acres of aplomado falcon habitat would be managed as lands with wilderness characteristics, providing the benefits described in management common to all action alternatives for the species on that amount of habitat. Other special status animal species for which there is no geographical information likely also occur on lands with wilderness characteristics and would benefit from the restrictions on human disturbance. This alternative would be more beneficial for special status wildlife than the No Action Alternative.

Impacts from Alternative B

Under Alternative B, a total of 47,611 acres of the planning area would be managed as lands with wilderness characteristics, including 0 acres of aplomado falcon habitat. Impacts of this alternative on special status wildlife would be identical to that described for Alternative A for the falcon because the amount of falcon habitat impacted would be the same and less beneficial for other special status animal species that may have habitat in the lands with wilderness characteristics areas because the overall amount of habitat impacted would be less.

Impacts from Alternative C

Under Alternative C, a total of 35,715 acres of the planning area would be managed as lands with wilderness characteristics. Aplomado falcon habitat would not be included in lands with wilderness characteristics areas under this alternative and would not benefit.

Impacts from Alternative D

Under Alternative D, a total of 4,348 acres of the planning area would be managed as lands with wilderness characteristics. Aplomado falcon habitat would not be included in lands with wilderness characteristics areas under this alternative and would not benefit.

Impacts of Visual Resources Management Actions on Special Status Wildlife

Impacts from Management Common to All Alternatives

The impacts to special status wildlife from visual resources decisions are primarily associated with limitations on surface disturbance that is intended to reduce impacts on areas with high visual resource values. VRM Class I and II designations are the most restrictive of surface-disturbing activities, and would therefore be the most beneficial to special status wildlife and their habitats. In areas designated as VRM Class I or II, surface-disturbing activities are generally prohibited or limited. Table 4-58 shows the proposed VRM classes in acres for each alternative.

Table 4-58. Proposed VRM Classes in Acres

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205
Class IV	2,330,462	2,783,514	2,131,501	2,166,266	2,189,116

Under all alternatives, artificial lighting would continue to be used throughout the planning area, resulting in temporary and local impacts on special status wildlife. Artificial night lighting affects animal foraging behavior, reproduction, movement, and species interactions (such as predator) (Longcore and Rich 2004, 2005).

Impacts from the No Action Alternative

The No Action Alternative would designate 50,671 acres (or 1.8% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit special status wildlife in the ways described in Impacts from Management Common to All Alternatives.

Impacts from Alternative A

Alternative A would designate 273,710 acres (or 9.8% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit special status wildlife in the ways described in Impacts from Management Common to All Alternatives more than the No Action Alternative.

Impacts from Alternative B

Alternative B would designate 357,802 acres (or 12.9% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit special status wildlife in the ways described in Impacts from Management Common to All Alternatives more than the No Action Alternative. Because of the large area designated as Class I or II, this alternative is the most beneficial for special status wildlife when compare to all other alternatives.

Impacts from Alternative C

Alternative C would designate 67,962 acres (or 2.4% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit special status wildlife in the ways described in Impacts from Management Common to All Alternatives more than the No Action Alternative.

Impacts from Alternative D

Alternative D would designate 48,263 acres (or 1.7% of the planning area) as VRM Class I or II. Surface-disturbing activities would be prohibited or limited in this area, which would benefit special status wildlife in the ways described in Impacts from Management Common to All Alternatives less than the No Action Alternative.

Impacts of Minerals Management Actions on Special Status Wildlife

Impacts from Management Common to All Alternatives

Minerals designation definitions are given in Section 3.3.1, Minerals. The impact analysis below is based on the following assumptions in addition to those previously listed in this section.

Acres designated as open could be impacted by minerals development. Impacts from minerals development include habitat removal, crushing, or trampling of individuals, habitat fragmentation, displacement from breeding locations or other sensitive habitats, increased fugitive dust, changes in habitat structure or composition due to the introduction and spread of invasive and weedy plant species, increased potential for ingestion of toxic substances, and increased energy expenditure due to aversion of increased human noise and activity. These impacts can harm special status animal individuals, as well as decrease the health and abundance of populations.

Acres designated as open with moderate constraints would apply restrictive lease stipulations on minerals development, including actions required to mitigate negative impacts such as those listed above. Negative impacts associated with minerals development could occur in these areas, but mitigative and avoidance actions would be stipulated to lessen and mitigate for those impacts.

Acres designated as closed, withdrawn, or open with major constraints would be beneficial for special status wildlife because it would avoid all negative impacts associated with minerals management actions. This is because no minerals exploration or development could take place on areas that are closed or withdrawn. Areas that would be open with major constraints would be subject to NSO, meaning that habitat would not be removed and surface-disturbing activities would not occur.

Table 4-59 displays acres of special status animal habitat impacted by minerals management decisions.

Table 4-59. Minerals Management Decisions (Acres/% of habitat) by Alternative on BLM-administered Surface Lands

Species	Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable Minerals						
Aplomado falcon grasslands habitat	Closed and open with major constraints designations	7,994/8%	86,220/85%	100,008/99%	0/0%	0/0%
	Open with moderate constraints	91,451/91%	13,807/14%	22/<1%	81,741/81%	81,650/81%
	Open designations	1,562/1%	980/1%	977/1%	19,248/19%	19,346/19%
Aplomado falcon grasslands boundary habitat – Level 1	Closed designations	0/0%	54,141/55%	98,351/99%	0/0%	0/0%
	Open with moderate constraints	98,540/100%	44,390/45%	0/0%	97,332/99%	97,345/99%
	Open designations	0/0%	10/<1%	10/<1%	1,166/1%	1,166/1%
Aplomado falcon grasslands boundary habitat – Level 2	Closed designations	0/0%	125,049/99%	125,258/99%	0/0%	0/0%
	Open with moderate constraints	125,284/100%	209/<1%	0/0%	125,239/99%	125,252/99%
	Open designations	0/0%	26/<1%	26/<1%	0/0%	0/0%
Aplomado falcon grasslands boundary habitat – Level 3	Closed designations	16,529/95%	17,092/99%	17,310/100%	0/0%	0/0%
	Open with moderate constraints	781/5%	218/1%	0/0%	17,310/100%	17,310/100%
	Open designations	0/0%	0/0%	0/0%	0/0%	0/0%
Suitable LPC habitat	Closed and open with major constraints designations	107,772/35%	107,810/35%	274,038/91%	109,096/36%	57,029/19%
	Open with moderate constraints	178,196/60%	178,792/59%	8,933/3%	177,438/59%	219,112/72%
	Open designations	14,596/4%	14,073/4%	14,073/4%	14,073/4%	24,451/8%
LPC isolated population area	Closed and open with major constraints designations	5,197/<1%	5,479/<1%	329,784/52%	5,924/1%	5,924/1%
	Open with moderate constraints	624,515/99%	624,252/99%	299,947/47%	431,126/68%	314,610/50%
	Open designations	0/0%	0/0%	0/0%	192,662/30%	309,197/50%
LPC timing restriction area	Closed and open with major constraints designations	133,841/32%	133,869/33%	395,616/97%	135,160/33%	55,309/13%
	Open with moderate constraints	254,044/62%	261,748/64%	0/0%	253,314/62%	340,302/83%
	Open designations	18,753/4%	11,045/3%	11,045/3%	18,165/4%	11,050/3%
DSL habitat	Open with major constraints designations	10,074/5%	81/<1%	0/0%	37,922/19%	191/<1%
	Open with moderate constraints	156,623/80%	155,949/80%	0/0%	155,947/80%	193,681/98%
	Closed	29,607/15%	40,277/20%	196,307/100%	2,435/1%	2,435/1%

Species	Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Salable Minerals						
Aplomado falcon grasslands habitat	Closed designation	0/0%	81,804/81%	99,766/99%	200/<1%	200/<1%
	Open with special terms and conditions	0/0%	18,223/18%	264/<1%	81,776/81%	81,524/80%
	Open designation	101,000/99%	980/1%	977/1%	19,026/18%	19,277/19%
Aplomado falcon grasslands boundary habitat – Level 1	Closed designation	0/0%	1,263/1%	98,303/99%	97,191/99%	97,351/99%
	Open with standard terms and conditions	98,539/99%	97,132/99%	75/<1%	0/0%	0/0%
	Open designation	0/0%	145/<1%	162/<1%	1,347/1%	1,189/1%
Aplomado falcon grasslands boundary habitat – Level 2	Closed designation	0/0%	125,163/99%	119,982/96%	200/<1%	200/<1%
	Open with standard terms and conditions	0/0%	95/<1%	5,276/4%	125,033/99%	125,068/99%
	Open designation	125,277/99%	26/<1%	26/<1%	44/<1%	10/<1%
Aplomado falcon grasslands boundary habitat – Level 3	Closed designation	0/0%	17,310/100%	17,310/100%	0/0%	0/0%
	Open with standard terms and conditions	0/0%	0/0%	0/0%	17,310/100%	17,310/100%
	Open designation	17,310/100%	0/0%	0/0%	0/0%	0/0%
Suitable LPC habitat	Closed designation	55,929/18%	112,068/37%	267,442/89%	112,699/37%	62,945/20%
	Open with special terms and conditions	0/0%	174,698/58%	19,340/6%	173,853/57%	213,178/70%
	Open designation	244,651/81%	13,858/5%	13,829/5%	14,040/4%	24,467/8%
LPC isolated population area	Closed designation	4,810/<1%	9,748/2%	275,960/44%	9,527/1%	9,527/1%
	Open with special terms and conditions	0/0%	619,944/98%	353,762/56%	425,476/67%	310,068/49%
	Open designations	624,866/99%	39/<1%	8/<1%	194,724/31%	310,131/50%
LPC timing restriction area	Closed designation	54,208/13%	135,948/33%	395,597/97%	136,578/33%	59,034/14%
	Open with special terms and conditions	0/0%	259,876/64%	248/<1%	258,993/64%	336,577/83%
	Open designations	352,423/86%	10,838/3%	10,816/3%	11,089/3%	11,048/2%
DSL habitat	Closed designation	2,546/1%	43,316/22%	141,169/72%	43,915/22%	8,479/4%
	Open with special terms and conditions	0/0%%	152,988/78%	55,134/28%	151,968/78%	187,508/96%
	Open designation	193,748/99%	3/<1%	4/<1%	424/<1%	318/<1%

Species	Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Locatable Minerals						
Aplomado falcon grasslands habitat	Withdrawn	0/0%	101/<1%	101/<1%	0/0%	0/0%
	Open designation	101,006/99%	100,900/99%	100,900/99%	101,001/99%	101,001/99%
Aplomado falcon grasslands boundary habitat – Level 1	Withdrawn	0/0%	7/<1%	7/<1%	0/0%	0/0%
	Open designation	98,540/100%	98,533/99%	98,533/99%	98,540/100%	98,540/100%
Aplomado falcon grasslands boundary habitat – Level 2	Withdrawn	0/0%	145/<1%	145/<1%	0/0%	0/0%
	Open designation	125,284/100%	125,133/99%	125,133/99%	125,278/99%	125,278/99%
Aplomado falcon grasslands boundary habitat – Level 3	Withdrawn	0/0%	0/0%	0/0%	0/0%	0/0%
	Open designation	17,310/100%	17,310/100%	17,310/100%	17,310/100%	17,310/100%
Suitable LPC habitat	Withdrawn	0/0%	109,096/36%	265,257/88%	57,036/19%	57,036/19%
	Open designation	300,581/99%	191,474/64%	35,306/12%	243,529/81%	243,556/81%
LPC isolated population area	Withdrawn	0/0%	6,774/1%	273,832/43%	5,924/1%	5,924/1%
	Open designation	629,727/99%	622,953/99%	355,893/57%	623,804/99%	623,764/99%
LPC timing restriction area	Withdrawn	0/0%	135,164/33%	395,602/97%	55,315/14%	55,315/14%
	Open designation	406,639/99%	271,496/67%	11,055/3%	351,346/86%	351,346/86%
DSL habitat	Withdrawn	0/0%	40,357/21%	196,307/100%	2,626/1%	2,626/1%
	Open designation	196,307/100%	155,949/79%	0/0%	193,680/99%	193,680/99%

Table 4-59 displays acres of known habitat for three special status animal species; however, areas open to minerals development could also impact special status species for which habitat is not defined and/or known.

Impacts from Management Common to All Action Alternatives

Under all action alternatives, 99%–100% (101,007–241,135 acres) of aplomado falcon habitat, including grasslands habitat and grasslands boundary levels I, II, and III habitats, would be open to locatable minerals development on BLM lands, causing potential for adverse impacts described in management common to all alternatives.

Impacts from the No Action Alternative

Leasable Minerals

Under the No Action Alternative, approximately 8% (7,994 acres) would be closed or open with major constraints, 91% (91,451 acres) would be open with moderate constraints, and 1% (1,562 acres) of aplomado falcon grassland habitat (91,451 acres) would be open to leasable mineral development on BLM lands. Aplomado falcon grassland boundary habitat level 1 would have 0% (0 acres) closed, 100% (98,540 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. Aplomado falcon grassland boundary habitat level 2 would have 0% (0 acres) closed, 100% (125,284 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. Aplomado falcon grassland boundary habitat level 3 would have 95% (16,529 acres) closed, 5% (781 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. The No Action Alternative would be the least beneficial for this species and its habitat because the majority of the habitat would not be protected by closed or open with major constraints designations.

Under the No Action Alternative, 35% (107,772 acres) of suitable LPC habitat would be subject to closure or open with major constraints, 60% (178,196 acres) open with moderate constraints, and 4% (14,596 acres) open to leasable minerals on BLM lands. Also, under the No Action Alternative <1% (5,197 acres) of the LPC isolated population area would be subject to closure or open with major constraints designation, 99% (624,515 acres) open with moderate constraints, and 0 acres open to leasable minerals on BLM lands under the No Action Alternative. In addition, the No Action Alternative would subject 32% (133,841 acres) of LPC timing restriction areas to closure or open with major constraints, 62% (254,044 acres) open with moderate constraints, and 4% (18,753 acres) open to leasable minerals on BLM lands. This alternative would be the least beneficial for this species and its habitat because it would leave the largest percentage of habitat open to the surface-disturbing effects of development.

Under the No Action Alternative, 5% (10,074 acres) of DSL habitat would be subject to NSO, and 80% (156,623 acres) would be open with moderate constraints to leasable mineral development on BLM lands. The least amount of habitat would remain open under this alternative, and so would be the most beneficial for the species in that respect; however, it also designates the least amount of habitat as closed or subject to NSO.

Salable Minerals

Under the No Action Alternative, aplomado falcon grassland habitat would have 0% (0 acres) closed, 0% (0 acres) open with standard terms and conditions, and 99% (101,000 acres) would be open to salable mineral development on BLM lands. Aplomado falcon grassland boundary habitat level I would have 0% (0 acres) closed, 99% (98,539 acres) open with standard terms and conditions, and 0% (0 acres) open to salable mineral development on BLM lands. Aplomado grassland boundary habitat level II would have 0% (0 acres) closed, 0% (0 acres) open with standard terms and conditions and 99% (125,227 acres) open to salable mineral development on BLM lands. Aplomado grassland boundary habitat level III would have 0% (0 acres) closed, 0% (0 acres) open with standard terms and conditions and 100% (17,310 acres) open to salable mineral development on BLM lands. This alternative would be the least beneficial for this species and its habitat because the habitat is either open with special terms and conditions or open.

Under the No Action Alternative, 18% (55,929 acres) of suitable LPC habitat would be subject to closure or NSO and 81% (244,651 acres) would be open to salable minerals on BLM lands. Approximately <1% (4,810 acres) of LPC isolated population area would be subject to closure and 99% (624,866 acres) would be open to salable minerals on BLM lands under the No Action Alternative. In addition, the No Action Alternative would subject 13% (54,208 acres) of LPC timing restriction areas to closure and 86% (352,423 acres) open to salable minerals on BLM lands. This alternative would be the least beneficial for this species and its habitat because it would leave the largest percentage of habitat open to the surface-disturbing effects of development.

Under the No Action Alternative, 1% (2,546 acres) of DSL habitat would be closed and 99% (193,748 acres) would be open to salable mineral development on BLM lands. The greatest amount of DSL habitat would remain open under this alternative; therefore, the No Action Alternative would be the least beneficial for the species.

Locatable Minerals

The No Action Alternative would designate 99% (101,006 acres) of aplomado falcon grassland habitat as open and 0% (0 acres) withdrawn. Aplomado falcon grassland boundary habitat level I would have 100% (98,540 acres) open and 0% (0 acres) withdrawn to locatable mineral development on BLM lands. Aplomado falcon grassland boundary habitat level II would have 100% (125,284 acres) open and 0% (0 acres) withdrawn to locatable mineral development on BLM lands. Aplomado falcon grassland boundary habitat level III would have 100% (17,310 acres) open and 0% (0 acres) withdrawn to locatable mineral development on BLM lands. Because of the amount of habitat open to locatable minerals this alternative would be the least beneficial for the species.

The No Action Alternative would designate 99% (300,581 acres) of suitable LPC habitat, 99% (629,727 acres) of LPC isolated population habitat and 99% (406,639 acres) of LPC timing restriction area open to locatable mineral development on BLM lands and 100% (99,529 acres) open to locatable mineral development. Because of the amount of habitat designated as open, this alternative would have more adverse effects on the species than all other alternatives.

The No Action Alternative would designate 100% (196,307 acres) of DSL habitat open to locatable mineral development on BLM lands. Because of the amount of habitat designated as open, this alternative would have more adverse effects on the species than all other alternatives.

Impacts from Alternative A

Leasable Minerals

Under Alternative A, aplomado falcon grassland habitat would have 85% (86,220 acres) closed or subject to NSO, 14% (13,807 acres) open with moderate constraints, and 1% (980 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level I would have 55% (54,141 acres) closed, 45% (44,390 acres) open with moderate constraints, and <1% (10 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level II would have 99% (125,049 acres) closed, <1% (209 acres) open with moderate constraints, and <1% (26 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level III would have 99% (17,092 acres) closed, 1% (218 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. Along with Alternative B, this alternative would be the most beneficial for this species and its habitat because of the closure and NSO stipulations on BLM surface lands. The impacts to the species on subsurface lands would be the same as the No Action Alternative.

Under Alternative A, 35% (107,810 acres) of suitable LPC habitat, <1% (5,479 acres) of LPC isolated population area and 33% (133,869 acres) of LPC timing area would be subject to closure or NSO. Alternative A would designate 59% (178,792 acres) of suitable LPC habitat, 99% (624,252 acres) of LPC isolated population area, and 64% (261,748 acres) of the LPC timing restriction area as open with moderate constraints. In addition, 4% (14,073 acres) of suitable LPC habitat, 0% (0 acres) LPC isolated population areas and 3% (11,045 acres) of the LPC timing restriction area would be open to leasable mineral development on BLM lands under Alternative A. Because of the amount of habitat closed or subject to NSO

stipulations, this alternative would avoid the same negative impacts on the species and its habitat as the No Action Alternative on BLM surface lands. The impacts to the species on subsurface lands would be the same as the No Action Alternative.

Under Alternative A, <1% (81 acres) of DSL habitat would be subject to NSO, 80% (155,949 acres) open with moderate constraints, and 20% (40,277 acres) would be closed to leasable mineral development on BLM surface lands. Because of the amount of habitat closed or subject to NSO stipulations, this alternative would avoid more negative impacts on the species and its habitat than the No Action Alternative on BLM lands.

Salable Minerals

Under Alternative A, aplomado falcon grasslands habitat would have 81% (81,804 acres) closed, 18% (18,223 acres) open with special terms and conditions, and 1% (980 acres) open to salable minerals development on BLM lands. Aplomado falcon grasslands boundary habitat level I would have 1% (1,263 acres) closed, 99% (97,132 acres) open with special terms and conditions, and <1% (145 acres) open to salable minerals development on BLM lands. Aplomado falcon grassland boundary habitat level II would have 99% (125,163 acres) closed, <1% (95 acres) open with special terms and conditions, and <1% (26 acres) open to salable minerals development on BLM lands. Aplomado falcon grasslands boundary habitat level III would have 100% (17,310 acres) closed, 0% (0 acres) open with special terms and conditions, and 0% (0 acres) open to salable minerals development on BLM lands. Along with Alternative B, this alternative would avoid the most negative impacts to this species and its habitat because of the amount of habitat open to salable leasing on surface lands, and would be more beneficial than the No Action Alternative.

Under Alternative A, 37% (112,068 acres) of suitable LPC habitat, 2% (9,748 acres) of LPC isolated population area and 33% (135,948 acres) of LPC timing restriction area would be subject to closure. Alternative A would designate 58% (174,698 acres) of suitable LPC habitat, 98% (619,944 acres) of LPC isolated population area and 64% (259,876 acres) of the LPC timing restriction area as open with special terms and conditions. In addition, 5% (13,858 acres) of suitable LPC habitat, <1% (39 acres) of LPC isolated population area, and 3% (10,838 acres) of the LPC timing restriction area would be open to salable mineral development on BLM surface lands. Because of the amount of habitat closed, or open with standard terms and conditions, this alternative would be more beneficial than the No Action Alternative because there is less habitat open.

Under Alternative A, 22% (43,316 acres) of DSL habitat would be closed, 78% (152,991 acres) would be open with special terms and conditions, and <1% (3 acres) would be open to salable mineral development on BLM lands. Because of the amount of habitat open to salable minerals on BLM lands, this alternative would be more beneficial than the No Action Alternative and Alternative D, but less beneficial than all other action alternatives.

Locatable Minerals

Impacts to aplomado falcon grassland habitat and aplomado falcon grasslands boundary habitat level 1, 2 and 3 are discussed in Impacts from Management Common to All Alternatives.

Under Alternative A, 36% (109,096 acres) of suitable LPC habitat, 1% (6,774 acres) of LPC isolated population area, and 33% (135,164 acres) of LPC timing restriction area would be subject to withdrawal. In addition, 64% (191,474 acres) of suitable LPC habitat, 99% (622,953 acres) of LPC isolated population area and 67% (271,496 acres) of the LPC timing restriction area would be open to locatable mineral development on BLM lands. Because of the amount of habitat subject to withdrawal this alternative would be more beneficial than the No Action Alternative, but less beneficial than Alternative B.

Under Alternative A, 21% (40,357 acres) of DSL habitat would be withdrawn and 79% (155,949 acres) would be open to locatable mineral development of BLM lands. Because of the amount of habitat open to locatable minerals development, this alternative would more beneficial than the No Action Alternative, and Alternatives C and D.

Impacts from Alternative B

Leasable Minerals

Under Alternative B, aplomado falcon grassland habitat would have 99 % (100,008 acres) closed or subject to NSO, <1% (22 acres) open with moderate constraints, and 1% (977 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level I would have 99% (98,351 acres) closed, 0% (0 acres) open with moderate constraints, and <1% (10 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level 2 would have 99% (125,258 acres) closed, 0% (0 acres) open with moderate constraints, and <1% (26 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level 3 would have 100% (17,310 acres) closed, 0% (0 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. Along with Alternative A, this alternative would be the most beneficial for this species and its habitat because of the closure and NSO stipulations on BLM surface lands. The impacts to the species on subsurface lands would be the same as the No Action Alternative.

Under Alternative B, 91% (274,038 acres) of suitable LPC habitat, 44% (275,960 acres) of LPC isolated population area, and 97% (395,616 acres) of the LPC timing restriction area would be subject to closure or NSO. Alternative B would designate 3% (8,933 acres) of suitable LPC habitat, 56% (353,762 acres) of LPC isolated population area and 0% (0 acres) of the LPC timing restriction area open with standard terms and conditions. In addition, 4% (14,073 acres) of suitable LPC habitat, 0% (0 acres) of LPC isolated population area, and 3% (11,045 acres) of the LPC timing restriction area would be open to leasable mineral development on BLM lands under Alternative B. Because of the amount of habitat closed or subject to NSO stipulations, this alternative would be more beneficial than Alternative D.

Under Alternative B, 0% (0 acres) of DSL habitat would be subject to NSO, 0% (0 acres) open with moderate constraints, and 100% (196,307 acres) would be closed to leasable mineral development on BLM lands. Because of the amount of habitat closed to leasable minerals, this alternative would be more beneficial than the No Action Alternative, Alternative C and Alternative D.

Salable Minerals

Under Alternative B, aplomado falcon grasslands habitat would have 99% (99,766 acres) closed, <1% (264 acres) open with special terms and conditions, and 1% (977 acres) open to salable minerals development on BLM lands. Aplomado falcon grasslands boundary habitat level I would have 99% (98,303 acres) closed, <1% (75 acres) open with special terms and conditions, and <1% (162 acres) open to salable minerals development on BLM lands. Aplomado falcon grassland boundary habitat level II would have 96% (119,982 acres) closed, 4% (5,276 acres) open with special terms and conditions, and <1% (26 acres) open to salable minerals development on BLM lands. Aplomado falcon grasslands boundary habitat level III would have 100% (17,310 acres) closed, 0% (0 acres) open with special terms and conditions, and 0% (0 acres) open to salable minerals development on BLM lands. Along with Alternative A, this alternative would avoid the most negative impacts to this species and its habitat because of the amount of habitat closed to salable leasing on BLM lands, and would be more beneficial than the No Action Alternative.

Under Alternative B, 89% (267,442 acres) of suitable LPC habitat, 43% (275,960 acres) of LPC isolated population area, and 97% (395,597 acres) of the LPC timing restriction area would be subject to closure. Alternative B would also designate 6% (19,340 acres) of suitable LPC habitat, 56% (353,283 acres) of LPC isolated population area, and <1% (248 acres) of the LPC timing restriction area open with special terms and conditions. In addition, 5% (13,829 acres) of suitable LPC habitat, <1% (488 acres) LPC isolated population area, and 3% (10,816 acres) of the LPC timing restriction area would be open to salable mineral development on BLM lands under Alternative B. Because of the amount of habitat closed, or open with standard terms and conditions, this alternative would be more beneficial for the species than all other alternatives.

Under Alternative B, 72% (141,169 acres) of DSL habitat would be closed, 28% (55,134 acres) would be open with standard terms and conditions, and <1% (4 acres) would be open to salable mineral development on BLM lands. Because of the amount of habitat closed to salable minerals, this alternative would be more beneficial for the species and its habitat than all other alternatives.

Locatable Minerals

Impacts to aplomado falcon grassland habitat and aplomado falcon grasslands boundary habitat levels 1, 2 and 3 are discussed in Impacts from Management Common to All Alternatives.

Under Alternative B, 88% (265,257 acres) of suitable LPC habitat, 43% (273,832 acres) of LPC isolated population area, and 97% (395,602 acres) of the LPC timing area would be subject to withdrawal. In addition, 12% (35,306 acres) of suitable LPC habitat, 57% (355,893 acres) of LPC isolated population area, and 3% (11,055 acres) of the LPC timing restriction area would be open to locatable mineral development on BLM lands under Alternative B. Because of the amount of habitat subject to withdrawal this alternative would have fewer impacts on the species and its habitat than all other alternatives.

Under Alternative B, 100% (196,307 acres) of DSL habitat would be withdrawn and 0% (0 acres) would be open to locatable mineral development on BLM lands. Because of the amount of habitat closed to locatable minerals, this alternative would be more beneficial for the species and its habitat than all other alternatives.

Impacts from Alternative C

Leasable Minerals

Under Alternative B, aplomado falcon grassland habitat would have 0% (0 acres) closed or subject to NSO, 81% (81,741 acres) open with moderate constraints, and 19% (19,248 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level I would have 0% (0 acres) closed, 99% (97,332 acres) open with moderate constraints, and 1% (1,166 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level II would have 0% (0 acres) closed, 99% (125,239 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. Aplomado falcon grasslands boundary habitat level III would have 0% (0 acres) closed, 100% (17,310 acres) open with moderate constraints, and 0% (0 acres) open to leasable mineral development on BLM lands. Other than the No Action Alternative, this alternative would allow the greatest amount of habitat to be open to leasable minerals with moderate constraints, leading to greater impacts on the species than Alternatives A and B.

Under Alternative C, 36% (109,096 acres) of suitable LPC habitat, 1% (5,924 acres) of LPC isolated population area, and 33% (135,160 acres) of LPC timing restriction area would be subject to closure or NSO stipulations. Alternative C would designate, 59% (177,438 acres) of suitable LPC habitat, 68% (431,126 acres) of LPC isolated population area, and 62% (253,314 acres) of the LPC timing restriction area as open with moderate constraints. In addition, 4% (14,073 acres) of suitable LPC habitat, 30% (192,662 acres) of LPC isolated population area, and 4% (18,165 acres) of the LPC timing restriction areas would be open to leasable mineral development on BLM lands under Alternative C. Because of the amount of habitat closed or subject to NSO stipulations, this alternative would be more beneficial than the No Action Alternative and Alternative D.

Under Alternative C, 19% (37,922 acres) of DSL habitat would be subject to NSO, 80% (155,947 acres) open with moderate constraints, and 1% (2,435 acres) would be closed to leasable mineral development on BLM lands. Because of the amount of habitat closed to leasable minerals, this alternative and Alternative D would be the least beneficial than all other alternatives.

Salable Minerals

Under Alternative B, aplomado falcon grasslands habitat would have <1% (200 acres) closed, 81% (81,776 acres) open with special terms and conditions, and 18% (19,026 acres) open to salable minerals development on BLM lands. Aplomado falcon grasslands boundary habitat level 1 would have 99% (97,191 acres) closed, 0% (0 acres) open with standard terms and conditions, and 1% (1,347 acres) open to salable minerals development on BLM lands. Aplomado falcon grassland boundary habitat level 2 would have <1% (200 acres) closed, 99% (125,033 acres) open with special terms and conditions, and <1% (44 acres) open to salable minerals development on BLM lands. Aplomado falcon grasslands boundary habitat level 3 would have 0% (0 acres) closed, 100% (17,310 acres) open with standard terms and conditions, and 0% (0 acres) open to salable minerals development on BLM lands. When compared to all other alternatives, this

alternative would have the most negative impacts to this species and its habitat because of the amount of habitat open with standard terms and conditions to salable leasing, except for the aplomado falcon grasslands boundary habitat level I which has the majority of the habitat closed to salable leasing.

Under Alternative C, 37% (112,699 acres) of suitable LPC habitat, 1% (9,527 acres) of LPC isolated population area, and 33% (136,578 acres) of LPC timing restriction area would be subject to closure. Alternative C would designate 57% (173,853 acres) of suitable LPC habitat, 67% (425,476 acres) of the LPC isolated population area, and 64% (258,993 acres) of the LPC timing area as open with standard terms and conditions. In addition, 4% (14,040 acres) of suitable LPC habitat, 31% (194,724 acres) of the LPC isolated population area, and 3% (11,089 acres) or the LPC timing restriction area would be open to salable mineral development on BLM lands. Because of the amount of habitat closed or open with standard terms and conditions, this alternative would be more beneficial than all other alternatives except for Alternative B.

Under Alternative C, 22% (43,915 acres) of DSL habitat would be closed, 78% (151,968 acres) would be open with special terms and conditions, and <1% (424 acres) would be open to salable mineral development on BLM lands. Because of the amount of habitat closed to salable minerals, this alternative would be more beneficial than all other action alternatives except for Alternative B.

Locatable Minerals

Impacts to aplomado falcon grassland habitat and aplomado falcon grasslands boundary habitat level I, II and II are discussed in Impacts from Management Common to All Alternatives.

Alternative C would recommend 19% (57,036 acres) of suitable LPC habitat, 1% (5,924 acres) of the LPC isolated population area and 14% (55,315 acres) of the LPC timing restriction area for withdrawal from locatable development. Under Alternative C, 981% (243,529 acres) of suitable LPC habitat, 99% (623,804 acres) of LPC isolated population area, and 86% (351,346 acres) of the LPC timing restriction area would be open to locatable mineral development on BLM lands. Because of the amount of habitat recommended for withdrawal from locatable mineral development, along with Alternative D, this alternative would have more negative impacts on the species and its habitat than all other alternatives except the No Action Alternative.

Under Alternative C, 1% (2,626 acres) of DSL habitat would be recommended for withdrawal and 99% (193,680 acres) would be open to locatable minerals. Because of the amount of habitat withdrawn to locatable minerals, along with Alternative D, this alternative would have more negative impacts on the species and its habitat than all other alternatives except the No Action Alternative.

Impacts from Alternative D

Leasable Minerals

Impacts of leasable minerals on aplomado falcon grassland habitat and aplomado falcon grasslands boundary habitat level I, II and III under Alternative D would be identical to Alternative C because the management actions would be the same.

Under Alternative D, 19% (57,029 acres) of suitable LPC habitat, 1% (5,924 acres) of LPC isolated population area, and 13% (55,309 acres) of the LPC timing restriction area would be subject to closure or NSO stipulations. Alternative D would designate 72% (219,112 acres) of suitable LPC habitat, 50% (309,197 acres) of LPC isolated population area, and 83% (340,302 acres) of the LPC timing restriction areas would be open with moderate constraints. In addition, and 8% (24,451 acres) of suitable LPC habitat, 50% (309,197 acres) of LPC isolated population area, and 3% (11,050 acres) of the LPC timing restriction area would be open to leasable mineral development on BLM lands. Because little habitat would be closed or subject to NSO stipulations for mineral development, this alternative would have more negative impacts on the species than all other alternatives.

Under Alternative D, <1% (191 acres) of DSL habitat would be subject to NSO, 98% (193,681 acres) open with moderate constraints, and 1% (2,435 acres) would be closed to leasable mineral development. Because no or very little habitat would be closed or subject to NSO stipulations for development, this alternative would have more negative impacts on the species than all other alternatives.

Salable Minerals

Impacts of salable minerals on aplomado falcon grassland habitat and aplomado falcon grasslands boundary habitat level I, II and III under Alternative D would be identical to Alternative C because the management actions would be the same.

Under Alternative D, 20% (62,945 acres) of suitable LPC habitat, 1% (9,527 acres) of LPC isolated population area, and 14% (59,034 acres) of the LPC timing restriction area would be subject to closure. Alternative D would designate 70% (213,178 acres) of suitable LPC habitat, 49% (310,068 acres) of LPC isolated population area and 83% (336,577 acres) of the LPC timing restriction area as open with special terms and conditions. In addition, 8% (24,467 acres) of suitable LPC habitat, 50% (310,131 acres) of LPC isolated population areas, and 2% (11,048 acres) of the LPC timing restriction areas would be open to salable mineral development on BLM lands under Alternative D. Because no or very little habitat would be closed or open with special terms and conditions for mineral development, this alternative would have more negative impacts on the species than all other alternatives.

Under Alternative C, 4% (8,479 acres) of DSL habitat would be closed, 96% (187,508 acres) would be open with special terms and conditions, and <1% (318 acres) would be open to salable mineral development. Because a minimal amount of DSL habitat would be closed for salable mineral development, this alternative would have more adverse impacts on the species than all other alternatives.

Locatable Minerals

Impacts to aplomado falcon grassland habitat and aplomado falcon grasslands boundary habitat levels 1 through 3 are discussed in Impacts from Management Common to All Alternatives.

Impacts of locatable minerals on LPC, DSL, and their habitats under Alternative D would be identical to Alternative C because the management actions would be the same.

Impacts of Land Use Authorizations Management Actions on Special Status Wildlife

Impacts from Management Common to All

All action alternatives would designate “exclusion” and “avoidance” areas for ROWs. ROWs would be prohibited in exclusion areas and would be avoided when possible in avoidance areas. Exclusion areas would result in beneficial impacts to most special status animal species because the negative impacts of habitat fragmentation, surface disturbance, weed invasion, and displacement due to human noise and activity would be avoided. Avoidance areas would often result in beneficial impacts, as described for exclusion areas; however, some ROW would be approved in these areas and some special status animal species would be impacted.

Table 4-60 displays the amount of aplomado falcon, LPC, and DSL habitat that would be open, avoided, or excluded from ROW development under each alternative.

Table 4-60. Land Use Authorizations Management Decisions on BLM-administered Lands

Species	Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Aplomado falcon grassland	Open	58,006/57%	951/1%	954/1%	6,364/6%	6,865/7%
	Avoid	0/0%	1,149/1%	22/<1%	51,623/51%	51,122/51%
	Exclude	0/0%	55,903/55%	57,030/56%	0/0%	0/0%
Aplomado falcon grassland boundary – Level 1	Open	57,887/59%	2/<1%	2/<1%	57,060/58%	57,083/58%
	Avoid	0/0%	4,796/5%	0/0%	785/<1%	762/<1%
	Exclude	0/0%	53,089/54%	57,885/59%	0/0%	0/0%
Aplomado falcon grassland boundary – Level 2	Open	93,186/74%	1/<1%	1/<1%	2/<1%	5,612/4%
	Avoid	0/0%	1/<1%	0/0%	93,139/74%	87,529/70%
	Exclude	0/0%	93,183/74%	93,185/74%	0/0%	0/0%
Aplomado falcon grassland boundary – Level 3	Open	11,007/64%	0/0%	0/0%	156/1%	156/1%
	Avoid	0/0%	0/0%	0/0%	10,850/63%	10,850/63%
	Exclude	0/0%	11,007/64%	11,007/64%	0/0%	0/0%
Suitable LPC habitat	Open	201,572/67%	1,319//<1%	1,319/<1%	148,951/50%	148,953/50%
	Avoid	3,582/1%	151,443/50%	18,356/6%	3,802//1%	50,371/17%
	Exclude	0/0%	52,385/17%	185,466/62%	52,385/17%	5,823/2%
LPC isolated population area	Open	517,052/82%	68/<1%	70/<1%	506,772/80%	507,990/81%
	Avoid	4,811/1%	515,037/82%	291,645/46%	9,174/1%	7,965/1%
	Exclude	0/0%	6,774/1%	230,157/37%	5,924/1%	5,924/1%
LPC timing restrictions	Open	275,073/68%	0/0%	9/<1%	205,223/50%	205,224/50%
	Avoid	1,894/<1%	206,638/51%	3,426/1%	1,407/<1%	67,617/17%
	Exclude	0/0%	70,337/17%	273,531/67%	70,337/17%	4,134/1%
DSL habitat	Open	161,944/82%	0/0%	0/0%	125,178/64%	125,179/64%
	Avoid	111/<1%	128,736/66%	51,075/26%	3,551/2%	36,684/19%
	Exclude	0/0%	33,328/17%	110,986/57%	33,328/17%	201/<1%

Table 4-61 displays the amount of acres of habitat that would be avoided, or excluded from ROW development under each alternative

Table 4-61. Lands Use Authorizations by Alternative on BLM-administered Lands (acres)

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,051,927	98,544	757,380	1,610,692	1,749,782
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540

Impacts from the No Action Alternative

Under the No Action Alternative 7,056 acres of BLM lands would be excluded from ROW development, which could prevent negative impacts to special status wildlife in the ways described in Impacts from Management Common to All Action Alternatives. ROW development would be avoided on 38,965 acres, which would avoid some of the negative impacts on special status wildlife. However, 2,051,927 acres would be open to ROW development which would lead to adverse impacts on special status species.

Impacts from Alternative A

Among others, Alternative A would designate the following areas for exclusion: habitat for federally listed/proposed threatened and endangered species, designated and proposed critical habitat for federally threatened and endangered species, wetland and riparian areas, lands with wilderness characteristics (described above). Alternative A would designate the following areas for ROW avoidance: BLM sensitive plant and animal species habitat, federal candidate species habitat, and open sand dunes. Federally listed species would benefit from the inclusion of their habitats in exclusion zones, and BLM sensitive animal species would benefit from the inclusion of their habitats in avoidance zones. This alternative would be more beneficial for special status wildlife than the No Action Alternative because of the greater amount of habitat avoided or excluded from ROW development.

Impacts from Alternative B

The nature of impacts from exclusion and avoidance areas would be similar under Alternative B to those described for Alternative A because the management actions would be the same. This alternative would be more beneficial for special status wildlife than the No Action Alternative because of the greater amount of habitat avoided or excluded from ROW development.

Impacts from Alternative C

Additionally, lands with wilderness characteristics would constitute exclusions areas only for pipeline and power line projects, and wetland and riparian areas would constitute exclusion areas only for roads. Under Alternative B, the following would be designated as avoidance areas: habitat for federally listed/proposed threatened and endangered species, designated and proposed critical habitat for federally threatened and endangered species, BLM sensitive plant and animal species habitat, federal candidate species habitat, and open sand dunes. Wetland and riparian areas would be avoidance areas for pipelines and power lines. Lands with wilderness characteristics would be avoidance areas for roads and sites. This alternative would be more beneficial for special status wildlife than the No Action Alternative because of the greater amount of habitat avoided or excluded from ROW development.

Impacts from Alternative D

This management action would have the greatest potential to result in the negative impacts described in Impacts of Special Status Species Management Actions on Special Status Wildlife. Also, all of the habitat types and designations listed under other alternatives as exclusion or avoidance areas would be avoidance areas under this alternative, resulting in fewer beneficial impacts to special status animal species than all other action alternatives. However, this alternative would still be more beneficial for special status wildlife than the No Action Alternative because of the greater amount of habitat avoided or excluded from ROW development.

Impacts of Renewable Energy Management Actions on Special Status Wildlife

Impacts from Management Common to All

Renewable energy management actions consist of high-level actions that would dictate the permitting, constructing, and maintaining wind, solar, and geothermal energy projects. Impacts on special status wildlife from renewable energy projects include short- and long-term displacement due to habitat removal and surface disturbance; habitat fragmentation, especially from linear aspects of projects such as power lines and pipelines; disruption of breeding and other sensitive activities due to human noise and disturbance; and reduction of available foraging habitat and available prey. Each of these impacts could result in decreased health of the individual and/or of the population.

Table 4-62 presents the planning area BLM-administered lands open, avoided, and withdrawn to renewable energy (geothermal, solar, and wind) under each alternative.

Table 4-62. Renewable Energy Management Decisions on BLM-administered Lands

Species	Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Geothermal and Solar						
Aplomado falcon grasslands (geothermal)	Open	44,221/44%	980/1%	980/1%	19,795/20%	19,518/19%
	Close	56,785/56%	100,027/99%	100,017/99%	81,199/80%	81,449/81%
Aplomado falcon grasslands boundary – Level 1 (geothermal)	Open	40,656/41%	10/<1%	10/<1%	97,329/99%	97,345/99%
	Close	57,885/59%	98,531/100%	98,516/99%	1,172/1%	1,130/1%
Aplomado falcon grasslands boundary – Level 2 (geothermal)	Open	35,498/28%	26/0%	26/0%	657/<1%	1,188/<1%
	Close	89,786/72%	125,258/100%	125,242/100%	124,603/99%	124,024/99%
Aplomado falcon grasslands boundary – Level 3 (geothermal)	Open	6,303/36%	0/0%	0/0%	0/0%	0/0%
	Close	11,007/64%	0/100%	0/100%	0/100%	0/100%
Aplomado falcon grasslands (solar)	Variance	1,220/1%	4,646/5%	4,646/5%	4,748/5%	4,847/5%
	Exclude	57,266/57%	53,839/53%	53,839/53%	53,718/53%	53,621/53%
Aplomado falcon grasslands boundary – Level 1 (solar)	Variance	4/<1%	4,871/5%	4,871/5%	8,671/9%	8,671/9%
	Exclude	57,885/59%	53,016/54%	53,016/54%	49,174/50%	49,175/50%
Aplomado falcon grasslands boundary – Level 2 (solar)	Variance	3,402/3%	2,441/2%	2,441/2%	2,524/2%	2,522/2%
	Exclude	89,786/72%	90,745/72%	90,745/72%	90,620/72%	90,622/72%
Aplomado falcon grasslands boundary – Level 3 (solar)	Variance	0/0%	405/2%	405/2%	405/2%	405/2%
	Exclude	11,007/64%	10,602/61%	10,602/61%	10,601/61%	10,601/61%
Suitable LPC habitat (geothermal)	Open	96,450/32%	188,319/63%	22,741/8%	187,687/62%	188,312/63%
	Close	204,142/68%	112,273/37%	277,850/92%	112,904/38%	112,280/37%
LPC isolated population area (geothermal)	Open	160,644/26%	616,470/98%	294,947/47%	614,612/98%	13,266/2%
	Close	469,086/74%	13,261/2%	334,740/53%	15,107/2%	616,462/98%
LPC timing restriction (geothermal)	Open	129,668/32%	270,711/67%	11,045/3%	270,077/66%	135,955/33%
	Close	276,994/68%	135,950/33%	395,576/97%	136,581/34%	270,704/67%
Suitable LPC habitat (solar)	Variance	1,023/<1%	150,719/50%	139,962/47%	150,088/50%	150,088/50%
	Exclude	204,146/68%	54,428/18%	65,180/22%	55,053/18%	55,053/18%
LPC isolated population area (solar)	Variance	53,760/9%	509,381/81%	485,316/77%	507,535/81%	507,534/81%
	Exclude	469,086/74%	13,258/2%	37,318/6%	15,098/2%	15,105/2%
LPC timing restriction (solar)	Variance	0/0%	206,990/51%	197,411/49%	206,359/51%	206,359/51%
	Exclude	276,994/68%	69,986/17%	79,559/20%	70,610/17%	70,614/17%

Species	Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
DSL habitat(geothermal)	Open	34,824/18%	152,991/78%	243/<1%	152,389/78%	152,984/78%
	Close	161,483/82%	43,316/22%	196,062/99%	43,915/22%	43,323/22%
DSL habitat(solar)	Variance	584/<1%	125,787/64%	122,653/62%	125,188/64%	125,188/64%
	Exclude	161,486/82%	36,277/18%	39,409/20%	36,869/19%	36,876/19%
Wind						
Aplomado falcon grasslands	Open	44/<1%	977/<1%	977/<1%	973/<1%	4,658/5%
	Avoid	57,962/57%	22/<1%	22/<1%	57,014/56%	0/0%
	Exclude	0/0%	57,007	57,007	0/0%	53,327/53%
Aplomado falcon grasslands boundary – Level 1	Open	45,406/46%	2/<1%	2/<1%	2/<1%	8,661/9%
	Avoid	12,481/13%	0/0%	0/0%	57,843/59%	49,176/50%
	Exclude	0/0%	57,885/59%	57,885/59%	0/0%	0/0%
Aplomado falcon grasslands boundary – Level 2	Open	28,140/22%	1/<1%	1/<1%	1/<1%	2,520/2%
	Avoid	65,045/52%	0/0%	0/0%	93,140/74%	90,620/72%
	Exclude	0/0%	93,185/74%	93,185/74%	0/0%	0/0%
Aplomado falcon grasslands boundary – Level 3	Open	6,829/39%	0/0%	0/0%	0/0%	405/2%
	Avoid	4,178/24%	0/0%	0/0%	11,007/64%	10,601/61%
	Exclude	0/0%	11,007/64%	11,007/64%	0/0%	0/0%
Suitable LPC habitat	Open	200,804/67%	1,333/<1%	1,319/<1%	1,320/<1%	1,319/<1%
	Avoid	4,361/1%	151,427/50%	20,280/7%	150,810/50%	197,381/55%
	Exclude	0/0%	52,385/17%	183,542/61%	53,009/18%	6,447/2%
LPC isolated population area	Open	499,585/72%	153/<1%	202/<1%	167,424/27%	167,427/27%
	Avoid	23,073/4%	516,350/82%	298,171/47%	349,300/55%	349,305/55%
	Exclude	0/0%	6,774/1%	224,901/36%	6,548/1%	6,548/1%
LPC timing restrictions	Open	267,458/66%	387/<1%	0/0%	2/<1%	0/0%
	Avoid	9,536/2%	205,250/50%	821/<1%	206,606/51%	272,217/67%
	Exclude	0/0%	70,337/17%	276,148/68%	70,961/17%	4,758/1%
DSL habitat	Open	148,895/76%	36/<1%	870/<1%	0/0%	0/0%
	Avoid	13,172/7%	128,699/66%	48,284	128,138/65%	161,271/82%
	Exclude	0/0%	33,328/17%	112,907	33,920/17%	793/<1%

In addition to the impacts described above, wind energy projects can also directly impact bird and bat species by collision with turbine blades (Arnett et al. 2007). Of avian species, songbird and raptor mortality has been most often documented at wind farms, and due to the timing of mortality most are thought to be killed while on their migration route (Arnett et al. 2007). Special status songbird and raptor species could be at risk for turbine collision if a wind farm is built in the planning area. Migrating bats have also been killed by wind turbine due to both collision and barotrauma, and bursting of lung capillaries due to extreme pressure changes (Baerwald et al. 2008). The majority of bat species killed at wind farms are not special status species; although there is still a risk of collision for high-flying special status bat species, such as the big free-tailed bat, long-legged myotis, and western small-footed myotis. In general, the presence of a wind farm raises the potential of mortality for many special status bird and bat species.

The LPC is thought to be especially sensitive to habitat loss, fragmentation, and the presence of vertical structures, as would occur with wind energy and associated power lines and roads (Woodward et al. 2001; Pruett et al. 2009). Habitat fragmentation is especially detrimental to the LPC because the barriers to movement prevent genetic mixing among populations, which can lead to inbreeding and the extirpation of local populations (Pruett et al. 2014). For these reasons, the LPC would be negatively impacted by wind energy development within its habitat.

Impacts from the No Action Alternative

Table 4-62 displays special status wildlife habitat that would be open/variance, avoided, and closed/excluded from renewable resources development under the No Action Alternative. This alternative would open approximately 18% to 44% of aplomado falcon grasslands habitat, including aplomado falcon grasslands boundary level 1 through 3 habitats, LPC habitat, including LPC isolated population area habitat, and LPC timing restriction area, as well as DSL habitat to geothermal and solar development, making it somewhat beneficial for those species by avoiding potential adverse impacts from development. However, most habitat for LPC and dunes sagebrush lizard would remain open to wind development, increasing potential for adverse impacts to these species from wind farms, as described in Impacts from Management Common to All Alternatives.

Under this alternative, restrictions would be placed on where wind energy projects could be permitted, such as along the face of the Guadalupe Mountains, in grassland areas in the northwestern portion of the planning area, within cave/karst occurrences, and in ACECs. Wind energy projects in proposed critical habitat for federally threatened and endangered species would be considered if the applicant can demonstrate to no negative impacts on avian and bat species. Due to these restrictions, impacts that could result from renewable energy development, such as those described in management common to all alternatives, would be avoided in certain parts of the planning area. Special status wildlife occupying those areas would benefit from these restrictions. The aplomado falcon occurs in the grasslands in the northwestern portion of the project area, and as such collision and surface disturbance impacts on that species would be avoided. However, the short- and long-term negative impacts associated with renewable energy development could occur throughout the remainder of the planning area, including in LPC habitat.

Impacts from Alternative A

Alternative A would exclude wind and solar and close lands to geothermal development from the following areas (among others): lands with wilderness characteristics, LPC habitat areas, wetlands and riparian areas, along the face of the Guadalupe Mountains, grassland areas in the northwestern portion of the planning area (aplomado falcon grasslands), designated and proposed critical habitat for federally threatened and endangered species, and habitat for federally listed and proposed threatened and endangered species for which critical habitat has not be designated. Special status animal species occupying these areas would benefit because the impacts associated with renewable energy development (as described in management common to all alternatives) would not occur.

Table 4-62 displays special status wildlife habitat that would be open/variance, avoided, and closed/excluded from renewable resources development under Alternative A. This alternative would close approximately 99% aplomado falcon and 37% LPC habitat from geothermal and 100 % of both habitats from wind energy development. It would also exclude 22% of the DSL habitat from geothermal and solar

development and exclude 100% from wind development. When compared to the No Action Alternative, this alternative would be less beneficial to special status wildlife because less land would be closed or excluded to renewable energy development. However, specific project proposals would undergo environmental review and impacts to special status species would be avoided.

Impacts from Alternative B

The management actions under Alternative B are identical to Alternative A except that wind l development would be avoided (not excluded) in habitat for federally listed and proposed threatened and endangered species for which critical habitat has not be designated. Avoidance means that development could occur if no other option is feasible, and so these types of projects could occur within this habitat designation. This alternative would result in more negative impacts, as described in management common to all alternatives, to federally threatened and endangered species and other special status species inhabiting those areas.

Table 4-62 displays special status wildlife habitat that would be managed as open/variance, avoid, closed, or excluded from renewable resources development under Alternative B. This alternative would close or exclude more aplomado falcon, LPC, and DSL habitat from solar and geothermal development than the No Action Alternative, making it more beneficial for these species. It would close more aplomado falcon, LPC, and DSL habitat from wind development than the No Action Alternative, making it more beneficial for these species in that respect by avoiding the potential adverse impacts of wind development.

Impacts from Alternative C

The management actions under Alternative C are identical to Alternative B except that wind development would be avoided (not excluded) in the grassland areas in the northwestern portion of the planning area. By not excluding this area from wind development, the aplomado falcon, Sprague's pipit, and other grassland special status animal species could be negatively impacted. Site-specific analysis would be conducted for proposed wind projects thereby identifying impacts to special status species.

Table 4-62 displays special status wildlife habitat that would be managed as open/variance, avoid, closed, or exclude from renewable resources development under Alternative C. This alternative would close or exclude less aplomado falcon, LPC, and DSL habitat from solar and geothermal development than the No Action Alternative, making it less beneficial for these species. More aplomado falcon, LPC, and DSL habitat would be managed as an avoidance area for wind development than the No Action Alternative, making it more beneficial for these species in that respect by avoiding the potential adverse impacts of wind development.

Impacts from Alternative D

The management actions under Alternative D are identical to Alternative B except that wind development would be open in the Chaves City and Bootheel areas, which are located in the grasslands in the northwestern portion of the planning area. Approximately 145,700 acres would be managed as an avoidance area for wind development. By not excluding this area from wind development, the aplomado falcon and other grassland special status animal species could be negatively impacted. Site-specific analysis would be conducted for proposed wind projects thereby identifying impacts to special status species.

Table 4-62 displays special status wildlife habitat that would be managed as open/variance, avoid, closed, or exclude from renewable resources development under Alternative D. This alternative would exclude or close less aplomado falcon, LPC, and DSL habitat from solar and geothermal development than the No Action Alternative, making it less beneficial for these species. More aplomado falcon, LPC, and DSL habitat would be managed as an avoidance area for wind development than the No Action Alternative, making it more beneficial for these species in that respect by avoiding the potential adverse impacts of wind development.

Impacts of Livestock Grazing Management Actions on Special Status Wildlife

Impacts from Management Common to All

Under all alternatives, livestock grazing would be continued in various portions of the planning area, with associated negative impacts on grassland special status wildlife. Livestock grazing can directly affect special status wildlife by competing for forage, or indirectly, through habitat degradation by the spread of invasive weeds, promoting the spread of mesquite, reducing local biodiversity or shifting species composition, and lowering local population densities for some species (Belsky et al. 1999; Drewa et al. 2001; Fleischner 1994). Cattle disperse honey mesquite seeds far from their source, contributing to an ongoing trend of mesquite encroachment on grasslands habitat (Drewa et al. 2001). Mesquite trees grow in dense stands, out-competing most other vegetation. Mesquite encroachment reduces the availability of habitat for special status wildlife that occur in grasslands, such as Baird's sparrow (*Ammodramus bairdii*), burrowing owl, mountain plover (*Charadrius montanus*), Sprague's pipit, black-tailed prairie dog, black-footed ferret (*Mustela nigripes*), and swift fox. Other detrimental impacts from grazing could include loss of forage biodiversity, lowering of plant and animal population densities, disruption of some ecosystem functions (such as increased fire, changes in soil composition), changes to community organization, and changes to the physical characteristics of both terrestrial and aquatic habitats (Chaneton and Lavado 1996; Fleischner 1994; Olff and Ritchie 1998).

Impacts from the No Action Alternative

Livestock grazing would continue to be allowed on nearly all of the surface area of all proposed ACECs, with continued adverse impacts on associated special status wildlife. Approximately 2,086,107 acres would remain open for grazing, and 5,226 acres would be closed. The impacts of grazing, as described in management common to all alternatives would continue on the lands open for grazing.

Impacts from Alternative A

Under Alternative A, 493,120 acres of BLM-administered land would be closed to livestock grazing, which is significantly greater than the No Action Alternative. The entire Birds of Prey ACEC (349,335 acres) would be closed to grazing. In areas closed to livestock grazing, special status wildlife inhabiting grassland habitat would benefit as more herbaceous food would become available from the removal of livestock competition. Without cattle in closed areas, the spread of mesquite would be reduced. Where feasible, grasses such as black grama (*Bouteloua eriopoda*) may be allowed to grow sufficiently for fire to occur as a natural disturbance, promoting the persistence of grasslands, with long-term benefits to various special status birds such as Baird's sparrow, Sprague's pipit, ferruginous hawk, and burrowing owl. Most of the closure to livestock grazing would be in the southern portion of the planning area, all increased forage/cover would be allocated to watershed and wildlife use, benefiting herbivorous special status wildlife.

Impacts from Alternative B

Under Alternative B, 153,583 acres of BLM-administered land would be closed to livestock grazing, primarily in the western and southern portions of the planning area, which is significantly greater than the No Action Alternative. In both areas, the absence of livestock grazing would result in long-term benefits for special status grassland species, such as the aplomado falcon and others mentioned above, because less mesquite encroachment and associated changes would take place over time. Furthermore, other negative impacts of grazing described in management common to all alternatives would be avoided. This alternative would close the most special status animal habitat to grazing and would therefore be the most beneficial for the resource.

Impacts from Alternative C

Under Alternative C, the acreage of lands closed to livestock grazing would be 8,115 acres, which is significantly greater than the No Action Alternative. The impacts resulting from livestock grazing as described in management common to all alternatives would continue to be a negatively impact habitat of grassland special status species. All increased vegetation from restoration efforts would be allocated to livestock. However, all increased forage/cover would be allocated to watershed and wildlife resources, partially mitigating for impacts due to forage competition with livestock.

Impacts from Alternative D

Under Alternative D, livestock grazing would be closed on 3,594 acres of BLM-administered lands, resulting in more negative impacts of grazing than any other action alternative, as described in management common to all alternatives. It is still, however, almost twice as much land closed to grazing as the No Action Alternative. This alternative would open more area to grazing than all other alternatives except the No Action Alternative.

Impacts of Travel Management Actions on Special Status Wildlife

Impacts of travel management on special status wildlife would be very similar to the impacts described for special status plants in Impacts of Travel Management Actions on Special Status Plants. This is because impacts are primarily based on acres of OHV use designations. Impacts from OHV on special status wildlife species are mostly associated with unrestricted cross-country use and use with open OHV areas. Potential direct and indirect, and short- and long-term impacts could occur in all habitat types where OHV use is unrestricted (open). Impacts include short-term adverse impacts to air quality from dust production, short- and long-term loss of vegetation cover from damage by vehicles and soil disturbance, mortality by collision, loss and disturbance of nests for ground-nesting avian species, habitat fragmentation, degradation of habitat through introduction of invasive and exotic weed species and associated impacts to habitat quality and quantity of available habitat, and displacement due to human noise and activity. Restricting OHVs to designated or existing routes would avoid the negative impacts of vegetation and habitat loss, but all other impacts would occur. The scale of these impacts would be considerably less, however, because they would only occur adjacent to OHV routes. Closure to OHV use would be beneficial for special status animal species that inhabit the closed areas, and constitutes a beneficial impact on special status wildlife. As noted in the Special Status Species Plants section, the No Action Alternative would designate the greatest closure to OHV use compared to all other action alternative.

Impacts of Special Designations Management Actions on Special Status Wildlife

Impacts of ACEC management on special status wildlife would be very similar to the impacts described for special status plants in Impacts of ACEC Management Actions on Special Status Plants. This is because impacts are primarily based on acres of ACEC designations. ACEC management decisions would generally reduce long-term impacts to the special status wildlife species that occur inside their boundaries. Impacts on special status wildlife vary among alternatives based on the acreage of areas designated as ACECs. ACECs are designated to protect identified relevant and important values, such as cultural resources, scenic qualities, and natural systems. Each ACEC is prescribed various levels of limitations on activities such as oil and gas leasing, ROWs, renewables development, livestock grazing, and travel. See Section 2.27, Special Designations for details on ACECs by alternative. ACEC designation would reduce impacts on special status plant species and habitats by limiting human activity and associated surface disturbances and thereby preserving habitat.

Four proposed ACECs overlap with the known distribution of special status wildlife in the planning area: Birds of Prey Grasslands, Boot Hill District, Laguna Plata, and Salt Playa. Other unknown and/or undefined special status wildlife habitats may occur in other proposed ACECs. For this reason, the total amount proposed under each alternative as well as acres of known special status wildlife habitat are reported for each alternative. Table 4-63 lists the total amount of area and known special status wildlife species habitats proposed for ACEC designation by alternative.

Table 4-63. Total ACEC Designations on BLM-administered Lands (acres)

Species	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
LPC	0	3,623	23,161	0	0
Total ACEC designations	***13,435***	***495,042***	***561,433***	***98,562***	***28,894***

Specific special status wildlife benefitting from the designation of each ACEC are:

- aplomado falcon in the Birds of Prey Grasslands ACEC;
- western snowy plover (*Charadrius alexandrinus nivosus*), DSL, LPC in the Laguna Plata ACEC;
- cave myotis in the Seven Rivers Hill ACEC;
- gray-banded kingsnake (*Lampropeltis alterna*) and banded rock rattlesnake (*Crotalus lepidus*) in the Serpentine Bends ACEC; and
- barking treefrog (*Hyla gratiosa*), western river cooter (*Pseudemys concinna*), plainbelly water snake (*Nerodia erythrogaster*), bald eagle, peregrine falcon, ferruginous hawk, yellow-billed cuckoo, and Bell's vireo in the Carlsbad Chihuahuan Desert Rivers ACEC.

Alternative B would be the most beneficial for special status wildlife because it would restrict surface-disturbing activities in more special status species habitat and more overall acres than all other alternatives.

Decisions to designate RNAs, WSAs, and WSRs would also benefit the special status wildlife that inhabits each particular area. This is because these designations generally reduce long-term impacts to special status wildlife that occur within their boundaries. WSAs are established to provide for the protection of wilderness character and for the use and enjoyment of visitors in a manner that leaves it unimpaired for future use. By definition, no surface disturbance, permanent new development, or ROWs would be allowed in the WSAs; the lands would be closed to oil, has, and mineral leasing.

4.2.6 Wildland Fire and Fuels Management

This section addresses the impacts to wildland fire and fuels management from management actions discussed in Chapter 2. Existing conditions are described in Section 3.2.7. Current management of the CFO fire management program follows guidance in the following documents:

- 2014 CFO FMP (BLM 2014c);
- *Fire and Fuels Management Plan Amendment and Environmental Assessment for Public Land in New Mexico and Texas* (BLM 2004a); and
- *Special Status Species Record of Decision and Approved Resource Management Plan Amendment* (BLM 2008b).

The CFO's fire program objectives are to concentrate fire suppression efforts in areas containing high resource or human values, as well as those with intermingled land ownership patterns, and to use prescribed fire and other fuel treatments to meet the objectives of other programs.

4.2.6.1 Analysis Methods

4.2.6.1.1 Indicators

Due to a lack of quantitative data relating to fire management, no quantitative indicators are assessed below. Instead qualitative assessments are made using the best available information and management plans that guide the management of fire across the planning area.

4.2.6.1.2 Methods and Assumptions

Impacts to wildland fire and fuels management from management actions in the following areas are analyzed in detail below:

- Wildland fire and fuels management
- Livestock grazing
- Travel management and recreation
- Minerals

Impacts from cultural resource actions on wildland fire and fuels management are largely associated with fire suppression tactics and therefore are similar across all alternatives. The FMPs state that fire suppression activities in cultural sensitive areas would be restricted to designated routes to protect the cultural resource values. It is not expected that cultural resource actions would impact fire management or fire risk differently under any alternative; therefore, it is not analyzed in detail here.

4.2.6.2 Direct and Indirect Impacts of Wildland Fire and Fuels Management Actions

The CFO FMP (BLM 2014c) provides fire management direction that is common to all alternatives being considered in this RMP/EIS. Under all alternatives, the CFO would use the above documents, including the 2014 FPM, which has a primary focus of improving the planning area's Fire Regime Condition Class (FRCC) and moving lands towards a more DPC. This plan is reviewed annually by the CFO and updated as necessary. The CFO is divided into four different fire management units based on location and vegetation type: Eastern Sandhill Country, Western Foothills, Pecos River Corridor, and Guadalupe Escarpment. There are currently no defined management goals for any of these areas; however, general objectives exist that are common to all areas. These objectives include controlling fires during the first burning period, suppressing all unplanned ignitions in areas where there is oil and gas infrastructure, managing using the full range of management response for all fires outside oil and gas fields, limiting the area burned of a single grazing allotment to no more than 25% to prevent economic hardship on the livestock operator, and protecting private property and infrastructure, including fences, utilities, oil and gas facilities, and livestock.

The CFO has a prescribed fire program in place that focuses on reduction of hazardous fuels within the wildland-urban interface (WUI), reduction of juniper encroachment and desert succulents, saltcedar control, and restoration of healthy watersheds. This program also aims to use prescribed fire to reduce FRCC 2 and 3 towards FRCC 1 and maintain areas previously treated by the Restore New Mexico program. Under all alternatives, the CFO may decide to use prescribed fire within the different management areas for restoration purposes during years of ample precipitation and sufficient vegetation. Fire planning documents state that prescribed fires may be used to annually treat up to 20,000 acres within the Eastern Sandhill Country and Western Foothills units, 1,500 acres within the Pecos River Corridor unit, and 15,000 acres within the Guadalupe Escarpment unit as stipulated in the 2014 FMP. The CFO may also use other non-fire treatment methods (mechanical removal, chemical and biological treatments, manual removal, seeding) to aid in restoration to the DPC and reduce the possibility of catastrophic wildfire. The ability of the CFO to implement fuel treatments over a maximum number of acres per year would aid with a general transition to a FRCC 1 and desired plant communities. Landscape-level fuel treatments require a long-term commitment to implement, monitor, and maintain the effectiveness of the treatments. Implementation of treatments depend on a number of factors such as climate (droughts), invasive species, catastrophic wildfire, percent slope (Map 2-63), and changes in threatened and endangered species habitat that may reduce the CFO's potential to achieve acreage goals. In light of these factors, improvements to the FRCC and desired plant communities may take several generations for actual accomplishments to be realized.

Effects on air quality, soils, vegetation, and other natural resources from wildland fire management are discussed under those sections.

4.2.6.2.1 Impacts of Livestock Grazing Actions on Wildland Fire and Fuels Management

Livestock grazing actions that would have impacts on wildland fire and fuels management are primarily the number of acres that are open or closed to livestock grazing. Impacts from grazing management include both beneficial and adverse impacts to the management of fire. Beneficial impacts include short-term reduction of the risk of large wildfires through the removal of the continuous fine fuel structure (Nader et al. 2007) (i.e., large expanses of grassland) and increases in water availability due to the presence of stock tanks and ponds. Strategically targeting grazing can be another beneficial impact, as areas can be determined where a reduction of fine fuels are needed, which can help decrease wildland fire size (Launchbaugh et al. 2008). Adverse impacts associated with grazing management on fire management

include long-term alteration to the vegetative community, including decreased species composition and increased fuel loading and structure, both of which impact the potential to restore site conditions to a FRCC of 1 (Drewa et al. 2001; Strand et al. 2014).

Table 4-64 outlines acreages open and closed to grazing under each alternative. Increased acres open to grazing may reduce fuel loads available to carry fire. If not properly managed, grazing can continue to exacerbate the departure of the historical fire regime and limit the ability for areas to be restored to the desired vegetative communities. As areas are closed to grazing, the grassland vegetation remains intact, supporting a more natural fire regime and helping to move grasslands or other desired vegetation towards an FRCC of 1.

Table 4-64. Proposed Livestock Grazing Acres Open and Closed under Each Alternative (BLM-administered lands only)

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
Closed	5,226	493,120	153,583	8,115	3,594
Total	***2,091,333***	***2,091,318***	***2,091,308***	***2,091,347***	***2,091,353***

4.2.6.2.2 Impacts of Travel Management and Recreation Actions on Wildland Fire and Fuels Management

Travel management and recreation actions that would have impacts on wildland fire and fuels management include restrictions on OHV use, camping locations, and campfires. OHV use and recreation both create a risk of human-caused fire to occur with the CFO planning area. Although spark arrestors are required for OHVs, fires can be ignited from sparks from other vehicle exhaust systems and heat from motors when vehicles are idle, as well as from unattended campfires. These risks significantly increase when travel and recreation occurs off designated routes. Most of the planning area will be OHV limited under all alternatives, eliminating most permitted cross-country travel (Table 4-65). Cross-country travel is more likely to bring heat and sparks from exhaust systems in direct contact with vegetation than travel on designated routes, which are typically devoid of vegetation. The No Action Alternative offers the most protection through OHV closures in approximately 3% of the planning area.

Table 4-65. Proposed Travel Management Decisions (acres) by Alternative (BLM-administered lands only)

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Recreation decisions impacting fire management include restrictions on campfires and dispersed camping in SRMAs. Restrictions on where and when camping and campfires may occur can help decrease the risk of human-caused wildfires and increase the potential to restore areas to desired vegetative communities and FRCC 1. This could be achieved through restricting these activities in areas with the greatest risk of catastrophic fire behavior and/or during seasons when fire risk is elevated.

Impacts of Special Designation Decisions on Wildland Fire and Fuels Management

Under all management alternatives special designations, including ACECs, WSRs, and WSAs, would be managed to protect natural resources and hazards, which would generally protect and benefit wildland fire and fuels management by retaining vegetation in its most natural state. In some areas restrictions on the type or timing of vegetation management practices would be in place. Management practices could include

mechanical extraction and prescribed burning, which are used to aid in returning the site to a DPC and FRCC. Procedures for management of both prescribed fire and wildfire in specially designated areas are outlined in detail in the 2014 CFO FMP and would not be managed differently under this RMP under an alternative (BLM 2014c). Fire suppression activities would be managed in accordance with travel prescriptions within special designations.

Grazing continues to be permitted in many sensitive areas (known threatened and endangered species habitat), as well as riparian and spring areas where acquisitions are completed. Special designation areas would also limit cross-country OHV travel and limit all vehicles to designated routes, which would have a positive impact because it would limit the number of human-caused ignitions. Camping and campfire restrictions are implemented at the field office level and not by ACEC. The overall impacts of OHV restrictions and camping/campfires are discussed under the Impacts of Travel Management and Recreation Actions on Wildland Fire and Fuels Management section above. Limiting unauthorized fire starts along with proper management would aid in returning these areas towards the DPC and FRCC by reducing the potential for uncharacteristically severe wildfire.

The overall acreage of ACECs proposed under each alternative can be found in Table 4-66 below. Overall, the action alternatives with the largest acreage within the ACECs would provide the greatest benefit to wildland fire and fuels management due to the decreased human and OHV use activities in these areas, which would reduce the chance for human ignitions. The No Action Alternative, which contains the fewest ACECs would have the greatest adverse impact to wildland fire and fuels management as a result of increased potential for human ignition.

Table 4-66. Acreage of Proposed ACECs under Each Alternative

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
13,435	495,042	561,441	98,562	28,894

Impacts of Minerals Actions on Wildland Fire and Fuels Management

Impacts from mineral actions on wildland fire and fuels management are largely associated with potential increased risk of human-caused fires because of mineral development. As mineral actions increase, vehicle traffic and number of workers in the area also increase, which can lead to an increased potential for wildfire ignitions resulting from equipment-related fires and careless human actions like improper disposal of cigarettes. Furthermore, mineral actions that increase road construction may make areas of the planning area more accessible to general visitor traffic, indirectly increasing potential human ignition sources in the area. The potential for a failure of a well or pipeline resulting in an ignition is also a possibility, as more infrastructure is developed within the planning area. The impacts associated with the mineral actions are best compared by showing the relative differences in acreage of lands open for mineral development activity under each alternative.

Table 4-67 below outlines the acreages open to mineral leasing or development under each alternative. The action alternatives that open the greatest number of acres to mineral management are likely to have the greatest adverse impacts on wildland fire and fuels management due to the increased potential for human- or equipment-related ignitions associated with those actions. Roadside fires will increase due to more vehicle traffic (water haulers, pickups) resulting in an increase in blown tires, hot exhaust pipes, etc. There is an increase in tank battery fires that spread to the wildland. There is also likely to be an increase in fires resulting from flares. Power lines arcing during high wind events or being clipped by traffic could also result in a number of fires each year. Conversely, those alternatives that close the greatest number of acres to mineral leasing or development reduce the potential human ignition sources, thereby causing the fewest impacts to wildland fire and fuels management.

Table 4-67. Acreage Open to Mineral Development by Alternative (BLM-administered surface lands only)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable minerals management decisions – open with standard terms and open with moderate constraints	2,555,280 (92%)	1,942,451 (70%)	1,539.240 (55%)	1,537,155 (91%)	2,629,316 (94%)
Salable minerals management decisions – open with standard terms and open with special terms and conditions	2,637,465 (95%)	2,222,256 (85%)	1,847,388 (84%)	2,536,717 (91%)	2,630,945 (94%)
Locatable minerals management decisions - open	2,751,856 (99%)	2,403,114 (86%)	2,110,098 (76%)	2,651,855 (95%)	2,661,705 (96%)

4.2.7 Cultural Resources

This section addresses the impacts to cultural resources from management actions discussed in Chapter 2. Existing conditions concerning cultural resources are described in Section 3.2.8.

4.2.7.1 Analysis Methods

4.2.7.1.1 Indicators

In the context of cultural resources, integrity refers to the ability of a site or property to convey its significance. In the planning area, most cultural resources are important for their traditional, scientific, and historic values. The great majority of sites are prehistoric and historic archaeological sites. Integrity of such sites is primarily related to the condition of their intact cultural deposits and constructed features. Archaeological data consist of both "objects" (including artifacts, architecture, features, etc.) and the horizontal and vertical relationships between these objects. The ability to interpret and understand the past is based on recovering not only the material culture of the past in the form of artifacts, buildings, and the built environment, but the spatial relationships between different aspects of material culture as well. Actions that result in surface or subsurface disturbance have a high potential to alter the locational relationships of artifacts and features relative to each other and would thus have an adverse effect on those resources. Actions that limit or eliminate surface- or subsurface-disturbing activities would protect the integrity of cultural resources, thus having a beneficial impact to those resources. Similarly, actions that increase human activity in or access to areas where cultural resources exist also increase the risk to such resources from looting, vandalism, or inadvertent damage. Conversely, actions that reduce or eliminate human activity in or access to an area with cultural resources reduce the risk to such resources from these same impacts.

For the purpose of this analysis, the indicator used to assess impacts to cultural resources from management actions is the number of acres of direct surface and subsurface disturbance to areas with high potential or sensitivity for cultural resources. This indicator provides a relative comparison of risk to sites from different management actions and is not used to estimate specific numbers of sites that could be affected.

4.2.7.1.2 Methods and Assumptions

Methods

Impacts to cultural resources are difficult to quantify with precision because the management actions being analyzed would be applied at the landscape scale; they do not identify specific projects or the exact locations where impacts would occur. Analysis of impacts to cultural resources was performed by reviewing reports of cultural resource investigations that have been completed in the project area, primarily the Class I investigation that was performed specifically for this RMP (Railey 2013).

One component of the Class I investigation performed by Railey (2013) included developing sensitivity maps for cultural resources. The purpose of these maps is to aid the CFO in assessing the expected time and labor investments for Section 106 undertakings and making land management decisions. The maps were designed to differentiate areas of high, medium, and low sensitivity for cultural resources throughout the CFO planning area. Four variables were selected to develop the sensitivity maps: 1) geographic areas (as defined by Railey 2013), 2) terrain slope, 3) vegetation zones, and 4) major rivers and streams (for a complete discussion of sensitivity maps, please refer to Railey 2013:195–211). All of these variables have been shown to have a strong correspondence to the presence or absence of cultural resources; that is, past humans selected lands to use or not use based on a number of environmental factors related to such things as availability of natural resources, steepness of terrain, etc. This map created by modeling these variables was overlain in GIS software with areas corresponding to specific proposed management decisions under each alternative to calculate the acreage where said decisions place cultural resource sites at risk for adverse effects. The resulting acreage is then used in the analysis below as a relative comparison between the different alternatives. Actions affecting areas of high cultural resource sensitivity pose more risk to cultural resources than those affecting other areas of lesser sensitivity. As such, the relative acreage of high sensitivity areas affected by the actions of a given resource program become the key factor in comparing the risk of one alternative over another. This is not to say, however, that individual cultural resource sites located in areas of moderate or low sensitivity are less valuable as TCPs, scientific, or historical resources than sites located high sensitivity areas. Rather, because the actions being assessed in this EIS are programmatic in nature, a programmatic level of analysis that considers cultural resources as a whole rather than as individual resources is appropriate. Therefore, the analysis presented below focuses on comparing relative risk by alternative to areas of high cultural resource sensitivity.

This approach to impact analysis provides only a high-level look at relative risks to cultural resources and is not a substitute for intensive pedestrian inventory for cultural resources. That is, this analysis itself is not appropriate for approving specific undertakings in specific locations. Rather, it is to be used for making programmatic level decisions and to form the basis off of which more project-specific assessments are to occur. These more specific assessments occur under the requirements of the NHPA (Public Law [PL] 89-665; 54 United States Code [USC] 300101 *et seq.*, as amended), BLM standards, and the Protocol Agreement between the BLM and the New Mexico SHPO (BLM 2014) and provide a much more thorough consideration of cultural resources that could be affected by actions on BLM-administered lands or actions approved by the BLM that affect resources on other lands.

Beyond the sensitivity mapping, the analysis below includes professional judgment regarding the relative risk to cultural resources posed by specific management actions. Such judgment was applied for management actions where acreage calculations are an inappropriate measure of risk. Examples of such actions include air quality measures, health and safety measures, and administrative measures.

Assumptions

The following assumptions were used during analysis of impacts to cultural resources:

- The sensitivity model used in this analysis adequately represents the density of cultural resources in the planning area and can be compared to proposed management decisions to produce a quantifiable assessment of potential risks to cultural resources at the landscape scale.
- Management actions and land use allocations that restrict surface or subsurface development and disturbance generally prevent, reduce, or eliminate impacts to the integrity of cultural resources.
- Cultural resources are fragile and irreplaceable. In general, impacts to cultural resources from surface disturbance or physical alteration are long-term and irreparable.
- The requirements of the NHPA (PL 89-665; 54 USC 300101 *et seq.*, as amended) and its implementing regulations typically referred to as the Section 106 process, BLM standards, and the Protocol Agreement between the BLM and the New Mexico SHPO (BLM 2014) to identify historic properties, evaluate them for adverse effects, and resolve any adverse effects to historic properties (i.e., those resources determined eligible for the National Register of Historic Places [NRHP]) or those defined as TCPs or sacred sites would be applied at a project-level (site-specific) basis for all lands administered by the CFO. Under these laws, policies, and agreements, pre-development investigations to identify cultural resources in project areas would be conducted and, if necessary, measures developed to avoid historic properties or otherwise minimize or mitigate adverse effects to them.
- The Permian Basin Programmatic Agreement would continue to be implemented for oil and gas and other industrial-related developments within the Permian Basin portion of the planning area until the Permian Basin Programmatic Agreement is terminated by its dated expiration or by other means.

4.2.7.2 Direct and Indirect Impacts

Impacts to the cultural resources in the planning area would primarily result from activities associated with direct surface and subsurface disturbance, such as development projects, recreational use/OHV travel, and fire management. However, direct impacts may also result from specific cultural resource management decisions, such as decisions to conduct archaeological excavations or implement interpretive programs. Indirect effects can occur from non-surface-disturbing activities that create visual and/or auditory effects or increase human activity in, and access to, certain areas. Visual and auditory impacts would apply primarily to sites or locations deemed sacred or traditionally important by Native American tribes and used by these groups in such a manner that visual obstructions and/or noise levels would impinge upon that use. These indirect effects can also affect other types of historic properties such as those determined to be eligible for the NRHP under Criteria A, B, or C, but typically not those eligible under Criterion D only.

As discussed above, the primary concern for impacts to cultural resources relates to disturbance of the artifacts, features, and architecture of sites in ways that reduce their integrity, alter their association with traditional values, and reduce the potential to recover data. Consequently, surface and subsurface disturbances have the greatest potential for direct adverse impacts on historic properties. Direct impacts can reduce or eliminate a site's scientific data potential, disrupt or prevent religious or traditional uses of sites or areas, reduce or eliminate the ability of Native Americans to gather traditional resources in a given area, alter or destroy important architectural features, or impinge upon the ability of the site to reflect its association with important historical events.

In general, impacts on cultural resources from surface and subsurface disturbance are long-term and permanent; once an archaeological site has been impacted, the effect typically cannot be reversed. However, as stated previously, short-term effects from visual or auditory impacts may occur, and can often be mitigated or accommodated. Long-term visual impacts may occur from such things as landscape alteration or the installation of structures.

Direct impacts to cultural resources tend to be adverse, but through the Section 106 process, these adverse effects are resolved and result in an increased understanding of the past. Stabilization of historic properties such as buildings or archaeological sites is considered to be a beneficial effect because the physical

deterioration of a site or structure is reduced or arrested. Through archaeological excavation, the important scientific and cultural information contained in a site is recovered. Archaeological data recovery, while directly disturbing the resources of a given site, also leads to an increased understanding of past lifeways and land uses. In addition to deepening the scientific and cultural understanding of past peoples, this information can be used to help predict where as yet identified sites may be located, which aids land managers in such things as targeting specific areas or landscape features for proactive investigation. Interpretive programs are intended to draw visitors to specific sites, which can, in some circumstances, lead to damage to the site in question, but more frequently results in increasing visitor awareness of and appreciation for cultural resources. This in turn leads—in most cases—to increased public stewardship of cultural resource sites.

Indirect impacts to cultural resources reflect greater variation in outcomes. That is, they are not mostly adverse or mostly beneficial in the way that direct impacts to cultural resources tend to be mostly adverse. For example, an auditory intrusion may indirectly adversely affect the use of a sacred or traditional use site, or a transmission line built next to a historic cabin may adversely alter the cabin's setting and feeling without physically disturbing the cabin. Alternatively, excluding livestock grazing or designating a mineral withdrawal in a given area indirectly benefits cultural resources by reducing sources of potential physical harm to those resources.

Impacts to cultural resources may be negligible or non-existent from management decisions related to some resource programs. In particular, management decisions for air quality, backcountry byways, health and safety, soil, and water resources are expected to have little or no direct or indirect effect on cultural resources within the planning area. Those actions, determined through best professional judgment as having little or no potential for impacts on cultural resources, are not discussed further in this analysis. All other management decisions with the potential to impact cultural resources either beneficially or adversely are discussed in subsequent sections of this chapter.

4.2.7.2.1 Impacts Common to All Alternatives

Certain management decisions affecting cultural resources would apply to all alternatives and would impact such resources equally, regardless of the alternative. Table 4-68 summarizes the anticipated impacts to cultural resources that may be anticipated under all alternatives. In many cases, proposed common management actions apply across several resource programs. To the extent such actions may affect cultural resources, they are discussed only once in Table 4-68, under the first resource program to which such actions apply.

As noted above in the Assumptions section, in all cases where surface and/or subsurface disturbance is associated with a given resource program action, the Section 106 process of the NHPA, BLM policies, and the 2014 Protocol Agreement would be followed.

Table 4-68. Impacts Common to All Alternatives

Resource Program	Impact to Cultural Resources
Cultural Resources	Compliance with all existing statutes, regulations, formal agreements, EOs, and policies applicable to cultural resources, including the NHPA, the Native American Graves Protection and Repatriation Act, and existing treaties and trust agreements, would reduce opportunities for short- and long-term, adverse impacts to cultural resources. Requiring cultural resource assessments, which may include field investigations, prior to development at the project-specific level in compliance with Section 106 of the NHPA provides for long-term effects to historic properties by creating opportunities to avoid, minimize, and mitigate adverse effects to individual resources.
Wildland Fire Management	Protection of cultural resources was incorporated into the CFO FMP (BLM 2012), which would be implemented across all alternatives. The plan limits the use of fire retardants in areas of known petroglyph sites, which are susceptible to damage from the chemicals. Mechanical fuels treatments are limited to minimize potential disturbance of cultural resource sites, and decisions regarding response to wildland fire take into account the protection of cultural resources as a decision factor. All of these actions positively impact cultural resources in the long-term by reducing or eliminating unnecessary disturbance of cultural sites.
Land Tenure	Retaining lands not identified for disposal affords the protection of federal laws, such as the NHPA, to cultural resources present on those lands. BLM-administered lands identified for disposal, which are to be transferred to non-federal entities may contain historic properties, but through the Section 106 process, these properties are considered and measures to avoid, minimize, or mitigate any adverse effects would be implemented prior to transfer.
Land Use Authorizations	ROWs would be granted in a manner that is compliant with the NHPA. Through this process, adverse effects are resolved and special stipulations, if necessary, to the ROW are developed. Authorizations of new land uses in previously undisturbed areas would continue across all alternatives per BLM policy and in compliance with the Section 106 process. With each area of new disturbance comes the risk of inadvertent adverse impacts to historic properties not identified during the Section 106 process (e.g., sites that are buried and cannot be identified during pre-construction inventories for cultural resources).
Leasing – All Oil and Gas, Minerals, and Non-Energy Solid Leasables	Leasing, regardless of resource type, poses risk of both direct and indirect impacts to cultural resources. Direct impacts typically occur through physical disturbance of cultural resources during project development. As noted above, these risks are offset by implementation of the Section 106 process. Indirect impacts to cultural resources from leasing decisions typically occur through such actions as vandalism or looting resulting from increased human presence or erosion of sites created by adjacent surface disturbance.
Recreation	Designation and management of SRMAs and other recreation-emphasis areas focuses on managing user behavior in those areas. These designations are intended to direct and focus recreational activity to these areas. On the one hand, this focused activity increases the risk of both direct and indirect adverse impacts to cultural resources—including intentional vandalism and looting, unintentional damage, increased erosion, trampling of artifacts and features, and other effects, particularly along roads and trails in and around designated camping areas. On the other hand, proactive and careful management of the recreation areas—particularly in those areas focused on cultural resources—to educate users and direct activity away from sites reduces risks to cultural resources from user activities and can help to deter intentional and unintentional acts of vandalism. All recreational developments are also subject to the Section 106 process at the project level.

Resource Program	Impact to Cultural Resources
Renewable Energy	Wind energy development would be restricted or excluded in designated archaeological districts and TCPs. Most of the planning area would be excluded from solar energy development based on the decisions from the Solar Programmatic EIS. These actions provide long-term beneficial impacts to cultural resources by eliminating one source of ground-disturbing activity that has the potential to damage cultural resources.
Minerals Allocations	Placement of major constraints—essentially NSO—for minerals development in portions of the planning area would result in long-term benefits for cultural resources in those areas compared to areas with fewer surface occupancy constraints. Beneficial impacts to cultural resources would include a decreased risk of physical disturbance due to surface activities and fewer visual and auditory intrusions.
Special Designations	Designation and management of ACECs and Cultural Resource Management Areas to protect environmental and cultural resources provides long-term beneficial impacts to cultural resources by placing restrictions on ground-disturbing activities and development with the potential to damage such resources. The magnitude of the effects varies by alternative relative to the number of acres on which restrictions are placed; these differences are discussed in more detail, below. Closing WSAs to mineral leasing and managing them for VRM Class I conditions would have long-term indirect benefits on cultural resources by reducing risks of direct physical disturbance of sites but would also restrict opportunities for scientific research into those sites and limit the benefits such research provides to the public and to resource managers.
Travel Management	Cross-country OHV travel would be limited to wildland fire suppression activities, emergency response situations, and activities related to the administration of a BLM permit, such as a group use permit. Cross-country OHV travel for recreation, hunting, and fishing would no longer be permissible. This would have an overall beneficial impact to cultural resources, insofar as it would limit the number of user-created trails passing over or within proximity to archaeological sites and reduce a source of physical disturbance to those sites. However, travel on existing roads also presents risks to cultural resources. Some existing roads have not been inventoried for the presence of cultural resources that may have been affected by their creation or that may be experiencing ongoing impacts. Such impacts may come from vehicles pulling off the side of the road, visitors damaging accessible sites through vandalism or looting, or erosion created by stormwater runoff from the road. Data are lacking to fully quantify the impacts from travel on existing roads, but land managers agree that such ongoing impacts are likely.
Vegetation	Mechanical and chemical treatments would be used to manage vegetation to desirable conditions in the planning area. Such actions increase risk of long-term adverse effects to cultural sites from physical disturbance and chemical damage to artifacts, rock art, and similar cultural materials. However, all proposed mechanical treatments would be subject to Section 106 review prior to implementation. This process would help offset the risk of physical disturbance posed to cultural resources from such treatments.
VRM	Designation and management of WSAs and certain ACECs as VRM Class I would reduce risks of direct and indirect adverse impacts to cultural resources within those areas because surface-disturbing activities are limited. This would result in potential long-term, beneficial impacts to cultural resources.

4.2.7.2.2 Impacts Common to All Action Alternatives

Certain management decisions under consideration are common only to the action alternatives (Alternatives A–D) and not to the No Action Alternative. These decisions have the potential to affect cultural resources in the CFO in the same way, regardless of which action alternative is considered. Table 4-69 summarizes the potential impacts to cultural resources from these common decisions under the action alternatives. As with impacts common to all alternatives, following the Section 106 process, the Protocol Agreement, and standard BLM policies, adverse effects to historic properties from any program action would be resolved at the project level and prior to project implementation.

Table 4-69. Impacts Common to All Action Alternatives

Resource Program	Impact to Cultural Resources
Cave and Karst Resources	See Special Designations.
Land Tenure	Cultural resources are frequently found in conjunction with natural freshwater sources. Additionally, natural waters are often considered sacred by Native American tribes affiliated with the planning area and may be considered TCPs. Closing all BLM springs and seeps to salables and mineral disposal and withdrawal of the same from locatable minerals would provide for long-term benefits to cultural resources. These actions would reduce sources of surface disturbance that can directly and adversely impact cultural resources. Land exchanges (to acquire lands or interest in lands) would prioritize acquiring lands with, among other resources, cultural resources determined to be unique or of traditional or scientific importance. Land exchanges would also prioritize lands needed to protect environmental resources—including cultural resources—on existing BLM-administered lands. Placement of lands under BLM management subjects them to considerations and protections under federal law (e.g., the NHPA). If acquired lands are not already federally owned prior to acquisition, extending federal cultural resource management laws to them creates long-term indirect benefits for cultural resources.
Livestock Grazing	The placement of livestock infrastructure (e.g., water developments, exclosures, etc.) would be avoided in all archaeological districts, thus reducing, though not eliminating, a source of long-term adverse effects to historic properties from surface disturbance. Similarly, new fences would only be allowed in archaeological districts in previously disturbed areas, where the risk of adverse effects to historic properties is low.
Recreation	Prohibitions on camping within 900 feet of any natural water source (excluding the Pecos River) would have long-term beneficial impacts to cultural resources that may be present at such locations, by reducing potential risks from looting, vandalism, and inadvertent damage. Archaeological sites are often found near natural water sources, and so this kind of camping prohibition would be particularly effective in protecting cultural resources. All action alternatives would prohibit rock climbing routes within petroglyph sites, thereby protecting these sites from rock-climbing impacts such as panel damage and destruction. Black River, Hackberry Lake OHV Area, Conoco Lake, and La Cueva Trails would be designated as SRMAs. Non-motorized use would either be closed or restricted to existing routes in all of these areas Such measures reduce risk to cultural resources for long-term direct adverse impacts from surface disturbance, trampling, vandalism, and looting unless existing routes pass through, directly adjacent to, or lead to cultural resource sites.
Renewable Energy	Restrictions would be placed on renewable energy development within established archaeological districts and in close proximity to TCPs. These measures reduce the risk of long-term adverse impacts to cultural resources from surface disturbance or visual or auditory intrusion by minimizing development and aboveground structures.

Resource Program	Impact to Cultural Resources
Special Designations	Management of the Lonesome Ridge ACEC (including, for example, excluding future ROWs; withdrawing from mining claim location and mineral material disposal; limiting motorized vehicle use, oil and gas exploration, and renewable energy development; and managing for VRM Class I objectives) would provide long-term indirect benefits to cultural resources. This management strategy would limit surface-disturbing activities and the introduction of aboveground structures that could directly disturb or indirectly intrude upon cultural sites. Management of 7,086 acres as WSAs (with limitations on surface disturbance, grazing, travel, and similar actions) provide for similar positive effects to cultural resources.
Travel Management	Limiting roads and trails within archaeological districts to previously disturbed areas, as well as restricting travel to existing and designated routes (throughout the planning area and in portions of WSAs not closed to motorized vehicle use) provides for long-term beneficial effects to cultural resources. Cross-country travel would be reduced, and therefore the direct and indirect effects to cultural resources caused by such travel—including direct disturbance, vandalism, and looting—would also be reduced. However, negative impacts to cultural resources also occur from use of existing roads. Portions of the existing road system were not inventoried for cultural resources prior to the creation of the roads. This means that some roads may have been created through or directly adjacent to cultural resource sites, which has either directly physically impacted those sites or has introduced indirect impacts. These indirect impacts occur from vehicles pulling of the roads, increased visitor access that results in looting and vandalism, and erosion caused by the road. Data about the numbers of sites impacted in these ways are too limited to quantify the extent of these impacts.

4.2.7.2.3 Impacts of Cultural Resource Actions on Cultural Resources

Cultural resource program decisions are the same across all alternatives or across all action alternatives.

4.2.7.2.4 Impacts of Land Use Authorizations on Cultural Resources

Many anticipated effects of authorizations on cultural resources are discussed under other categories because the specific action under another categories is the potential impact agent, not the authorization itself. See also the discussion below on special status species under Impacts Common to All Alternatives and Impacts Common to All Action Alternatives and Special Designations decisions and their anticipated impacts on cultural resources.

Under the No Action Alternative risks to cultural resources from land use authorizations would continue at current levels. By comparison to the action alternatives, the No Action Alternative would pose a higher risk to cultural resources by designating substantially more acres to as open to new utility and transportation ROWs (see Table 4-70). The larger the area designated open to ROWs—where surface disturbance could occur—means the more cultural resources are potentially at risk of direct disturbance under the No Action Alternative than under the action alternatives. This risk, however, is offset by implementation of the aforementioned Section 106 process prior to any authorization of surface disturbance under all alternatives, including the No Action.

Table 4-70. Comparison of Acres Designated Open for New ROWs in High Cultural Sensitivity Areas

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
489,016 (40%)	270,993 (22%)	254,144 (21%)	378,909 (31%)	428,177 (35%)

* Percent of all surface and subsurface lands with high cultural resources sensitivity.

Compared to the action alternatives, the No Action Alternative designates the least amount of land as ROW avoidance and exclusion in high cultural resource sensitivity areas (see Table 4-71); it also designates the most land as open for ROWs. Because development of ROWs has the potential to adversely affect cultural resources through direct surface disturbance, the land use authorizations program action under the No Action Alternative would pose the greatest risk to cultural resources among all alternatives. This risk, however, is offset by implementation of the aforementioned Section 106 process prior to any authorization of surface disturbance under all alternatives, including the No Action.

Table 4-71. Comparison of ROW Avoidance and Exclusion Zones in High Cultural Sensitivity Areas

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
18,070 (1%)*	236,068 (196%)	252,957 (21%)	128,151(14%)	78,887(6%)

* Percent of all surface and subsurface lands with high cultural resource sensitivity.

Among the lands designated for avoidance under the No Action Alternative are the Laguna Plata and Maroon Cliffs Archaeological Districts (13,155 acres combined). Additionally, no surface disturbance would be allowed within the Gnome withdrawal (680 acres) under the No Action Alternative. These actions all provide for long-term positive effects to cultural resources by reducing the risk of adverse effects associated with ROW development and use. Under all action alternatives, substantially more acreage would be allocated to ROW avoidance and exclusions zones than under the No Action Alternative. Under action Alternatives A, B, and C, ROW avoidance and exclusion zones would be designated with specific attention paid to TCPs and archaeological districts. ROW avoidance and exclusion zones under Alternative D would not specifically focus on TCPs and archaeological districts.

4.2.7.2.5 Impacts of Livestock Grazing Actions on Cultural Resources

Impacts to cultural resources from grazing typically include long-term direct adverse impacts from trampling of artifacts and features or long-term indirect adverse impacts from increases to or changes in erosion patterns. Alternatives that close more lands in general to grazing and those that close more lands specifically in areas of high cultural resource sensitivity are considered to pose a lower risk to cultural resources and, therefore, provide greater long-term protection.

Under the No Action Alternatives, the grazing status of lands in the planning area would continue under current conditions, and risks to cultural resources from grazing would remain at current levels. Under the action alternatives, the acres of land allocated as open or closed to grazing would vary. In a comparison of all alternatives relative to the acres open to grazing in areas of high cultural resource sensitivity, the No Action Alternative poses the greatest risk of long-term adverse impacts to cultural resources as it would have the largest acreage open to grazing in such sensitivity areas (see Table 4-72). However, Alternative D, followed closely by Alternative C, would have only slightly fewer acres of high cultural resource sensitivity lands open to grazing than the No Action Alternative. Alternative A would leave between 84,000 and nearly 87,000 fewer acres open to grazing than the No Action Alternative and Alternatives C and D, thereby posing a somewhat lower risk to cultural resources from surface disturbance, trampling, and erosion associated with grazing. Alternative A would be the most beneficial to cultural resources overall in that it would have the fewest acres open to grazing and the most acres closed, but individual cultural resources in open grazing areas would still be vulnerable to grazing-related adverse impacts.

Table 4-72. Acres by Grazing Status for Each Alternative in High Cultural Sensitivity Areas

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	504,508 (41%)*	420,562 (34%)	453,764 (67%)	503,684 (41%)	506,854 (41%)
Closed	4,043 (0.3%)	88,295 (7%)	55,084(4%)	5,174 (0.4%)	2,007 (0.2%)

* Percent of all surface and subsurface lands with high cultural resource sensitivity.

4.2.7.2.6 Impacts of Minerals Actions on Cultural Resources

The effects of minerals program decisions on cultural resources primarily result from the surface disturbance associated with minerals development. The amount of estimated surface disturbance associated with minerals development under any given alternative varies depending by the type of mineral (leasable, salable, or locatable) and on the amount of land open or closed to mineral development. It also depends on the amount of land allocated to open status under the different management prescriptions (i.e., open with standard terms and conditions, open with moderate constraints, and open with major constraints). That is, the Section 106 process notwithstanding, lands "open with major constraints" pose a lower risk to cultural resources than lands "open with standard terms and conditions."

As with other impacts analyses, the consideration of acres open or closed to mineral development, as well as estimated acres of surface disturbance under the RFD scenarios for each alternative, are only proxy measures of risk to cultural resources and not accountings of how many cultural sites might actually be affected. To refine the estimation of risk, the analysis below compares the minerals allocations and estimated acres of surface disturbance by alternative relative to areas of high sensitivity for cultural resources.

Leasable Minerals

Table 4-73 provides a comparison of the allocations for leasable minerals in the planning area relative to areas of known or estimated high sensitivity for cultural resources. Alternatives with fewer acres open to minerals leasing provide greater protection to cultural resources by eliminating a source of surface disturbance that could directly and adversely impact such resources.

Table 4-73. Acres of Minerals Allocations for Fluid Leasable Minerals in High Cultural Sensitivity Areas

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	441,754 (36%)*	337,336 (27%)	316,843 (26%)	401,053 (33%)	481,895 (39%)
Open with moderate constraints (CSU)	150,232 (12%)	131,565 (11%)	74,781 (6%)	182,477 (15%)	119,863 (10%)
Open with major constraints (NSO)	24,006 (2%)	35,827 (3%)	82,645 (7%)	46,219(4%)	29,606 (2%)
Closed	22,191 (2%)	133,421 (11%)	163,873 (13%)	8,395 (0.7%)	6,790 (0.6%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

The RFD under each alternative should also be considered when assessing the potential impacts to cultural resources. The specific relevance of the RFD to potential effects to cultural resources is tied to the estimated surface and subsurface disturbance under each scenario. That is, simply because one alternative may have more acres allocated to leasable mineral development does not necessarily mean that alternative also has the highest estimated amount of surface and subsurface disturbance, which is the key factor in identifying risks to cultural resources for long-term adverse impacts. Table 4-74 compares the estimated acres of surface and subsurface disturbance in high cultural resource sensitivity areas by alternative for leasable minerals. Alternatives with fewer acres of estimated surface disturbance pose lesser risk to cultural resources from direct physical disturbance than alternatives with more acres of estimated surface and subsurface disturbance. To estimate the acres of surface and subsurface disturbance from leasable minerals in high cultural sensitivity areas, the total estimated acres of disturbance on all lands managed by the BLM under each alternative was multiplied by the percentage of high cultural sensitivity lands that would be open to varying degrees of surface and subsurface disturbance (i.e., open with standard terms and CSU) as shown in Table 4-71, above.

Table 4-74. Estimated Acres Surface Disturbance for Leasable Minerals in High Cultural Sensitivity Areas

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
5,758	3,580	2,670	5,843	6,067

Salable Minerals

Table 4-75 provides a comparison of the allocations for salable minerals in the CFO relative to areas of known or estimated high sensitivity for cultural resources. Alternatives with fewer acres of open allocations in areas of high cultural resource sensitivity pose less risk to cultural resources from direct physical disturbance than alternatives with more acres of open allocations.

Table 4-75. Acres of Minerals Allocations for Salable Minerals in High Cultural Sensitivity Areas

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	601,848 (49%)*	343,375 (28%)	328,701(27%)	415,651 (34%)	492,405 (40%)
Open with special terms and conditions	0 (0%)	162,237 (13%)	104,977 (9%)	164,819 (13%)	108,216 (9%)
Closed	36,198 (3%)	132,486 (11%)	204,416 (17%)	57,649 (5%)	67,489 (5%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

Locatable Minerals

Table 4-76 provides a comparison of the allocations for locatable minerals in the planning area relative to areas of known or estimated high sensitivity for cultural resources. Alternatives with fewer acres open to mineral entry in areas of high cultural resource sensitivity pose less risk to cultural resources from direct physical disturbance than alternatives with more acres open to entry. Similarly, alternatives with more acres of high cultural resource sensitivity areas recommended for withdrawal from mineral entry (i.e., closed) provide greater protection to individual cultural resources and the broader cultural record by eliminating a source of surface disturbance that could have direct, long-term, adverse effects to cultural resources.

Table 4-76. Acres of Minerals Allocations for Locatable Minerals in High Cultural Sensitivity Areas

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open to mineral entry	623,537 (51%)*	531,565 (43%)	473,320 (38%)	600,291 (49%)	604,602 (49%)
Recommended (or previously recommended) for withdrawal	14,650 (1%)	106,563 (9%)	164,805 (13%)	37,840 (3%)	33,495 (3%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

4.2.7.2.7 Impacts of Lands with Wilderness Characteristics Actions on Cultural Resources

Table 4-77 provides a comparison of acres that would be managed as lands with wilderness characteristics and under what type of management for each alternative. In general, management that protects wilderness characteristics maintains those characteristics and provides long-term benefits to cultural resources by substantially limiting surface development and other surface-disturbing activities that can result in long-term adverse impacts to cultural resources. When units are managed to emphasize multiple uses while applying some protective management (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics, there would be some long-term benefits to cultural resources as above but it would depend on the prescriptions for the individual units. See Section 4.2.9 Lands with Wilderness Characteristics for details. As such, the greater the number of acres managed to protect wilderness characteristics, the greater the protection afforded to cultural resources. Where lands with wilderness characteristics units are managed to emphasize other multiple uses as a priority over protecting wilderness characteristics, ground-

disturbing activities such as minerals development may be allowed and would therefore offer fewer protections to cultural resources.

Table 4-77. Acres of Lands with Wilderness Characteristics by Alternative

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	0	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	0	0	18,964	30,595	0
Emphasizes other multiple uses	0	0	0	30,862	65,446

Table 4-78 provides a comparison of acres of lands with wilderness characteristics by alternative in areas of known or predicted high cultural resource sensitivity. The greater the acreage managed to protect wilderness characteristics, the greater the anticipated protection of cultural resources in those areas, because surface disturbance in areas of high cultural sensitivity would be substantially reduced or eliminated.

Table 4-78. Acres of Lands with Wilderness Characteristics in High Cultural Sensitivity Areas

Management Levels	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	0	7,750 (0.6%)*	6,302 (0.5%)	2,197 (0.2%)	720 (<0.1%)
Emphasizes other multiple uses while applying some protective management	0	0	0	1,448	0
Emphasizes other multiple uses	0	0		4,833	6,510

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

4.2.7.2.8 Impacts of Recreation Actions on Cultural Resources

As discussed above, recreation decisions include the designation of SRMAs and ERMAs, which are managed areas of existing concentrated recreational use and human activity in the planning area. Human activity increases risks to cultural resources from looting, vandalism, and inadvertent damage. Within the planning area, SRMAs and ERMAs are generally not designated in areas of known high cultural resource sensitivity. This is an intentional action on the part the BLM to protect cultural resources. Designation of SRMAs and ERMAs affords increased protection to cultural resources outside these areas by directing recreational use to the SRMA and ERMA locations. Cultural resources within the SRMAs and ERMAs can both benefit and suffer from the designations. Benefits to cultural resources inside SRMAs and ERMAs can come from both active and passive management of those recreation areas to direct activity away from known sites, educate visitors about site stewardship, or control visitor numbers through permitting. However, concentrating activity in specific areas could also pose an increased risk to the cultural resources in those areas; in such cases, the most likely cause of impacts to cultural resources would be from unintentional damage (such as trampling) or vandalism. All formal recreational developments, such as trails or campgrounds, are subject to the Section 106 process at the development level, thereby ensuring the consideration of cultural resources in planning and locating such developments.

Table 4-79 provides a comparison of the high cultural resource sensitivity acres within the planning area that would be designated as SRMAs or ERMAs under the different alternatives. Based on the discussion above, those alternatives with the greatest acreage designated for recreation management would, in general terms, be considered to pose less risk to cultural resources.

Table 4-79. Acres of SRMA and ERMA Designations by Alternative in High Cultural Sensitivity Areas

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
35,025 (3%)*	24,490 (2%)	32,778 (3%)	32,344 (3%)	28,856 (2%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

4.2.7.2.9 Impacts of Renewable Energy Actions on Cultural Resources

Renewable energy management actions with the potential to impact cultural resources are those that would allow or exclude development. Potential risks to cultural resources from such development includes direct physical impacts from surface disturbance and indirect impacts from visual intrusions created by aboveground structures, particularly wind turbines, which can be seen over longer distances than typical structures associated with solar and geothermal developments.

Table 4-80 provides a comparison of the alternatives by how many acres of high cultural resource sensitivity areas in the planning area would be allocated to the management decisions of open (wind and geothermal) or variance (solar), avoid, and exclude (wind and solar) or closed (geothermal) for renewable energy. Alternatives with greater acreage allocated to the open/variance management category would allow surface disturbance from renewable energy development over a larger area, thereby representing a higher risk to cultural resource from direct impacts.

Table 4-80. Acres of Renewables Management Decisions in High Cultural Sensitivity Areas

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open (Geothermal and Wind) or Variance (Solar)					
Geothermal	177,171 (28%)	430,935 (68%)	354,923 (56%)	489,165 (77%)	542,695 (85%)
Solar	47,674 (4%)*	341,847 (28%)	323,948 (26%)	345,390 (28%)	389,868 (32%)
Wind	234,968 (19%)*	271,632 (22%)	254,581 (21%)	277,331 (23%)	320,066 (26%)
Avoid					
Wind	273,554 (22%)*	96,594 (8%)	65,482 (5%)	179,308 (15%)	159,302 (13%)
Exclude (Wind and Solar) and Close (Geothermal)					
Geothermal	460,893 (72%)	207,139 (32%)	283,128 (44%)	148,883 (33%)	95,369 (15%)
Solar	461,188 (37%)*	166,955 (14%)	184,861 (15%)	163,401 (13%)	118,938 (10%)
Wind	348 (0.03%)*	139,427 (11%)	187,590 (15%)	50,993 (.4%)	28,254 (2%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

4.2.7.2.10 Impacts of Special Designations Actions on Cultural Resources

In general, special designations include management actions that limit surface disturbance, and, in some cases, specifically target cultural resources for advanced protection measures. As such, they tend to have long-term benefits for cultural resources. The extent of the benefit (or risk) of any alternative is directly related to the specific management prescriptions that would limit surface disturbance or similar activities with the potential to damage cultural resources.

For the purpose of this analysis, specific prescriptions regarding the largest source of risk to cultural resources from long-term direct effects—minerals development—are used as a comparison of potential effects to cultural resources. That is, the acres available and unavailable for minerals development within special designation areas under each alternative are compared. Those special designations with fewer acres open to minerals development or with more of the open acres but having major constraints on surface occupancy are considered less risky to cultural resources. Table 4-81 provides a comparison between the alternatives relative to the acreage that would available or unavailable to minerals development in areas of special designations.

Table 4-81. Minerals Allocations under ACEC Designation by Alternative on all BLM Lands

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable Minerals					
Open with standard terms and conditions	1,438	71,191	61,907	33,947	–
Open with moderate constraints	–	1,389	4,732	19,932	–
Open with major constraints	4,816	22,870	98,534	16,644	9,766
Closed	7,262	399,592	396,260	28,120	19,127
Salable Minerals					
Open with standard terms and conditions	822	71,286	64,536	33,973	
Avoid	–	226,119	198,518	19,766	2,42426,468
Closed	12,694	197,644	298,343	44,905	
Locatable Minerals					
Open with standard terms and conditions	12,534	398,081	406,383	54,689	2,424
Withdrawn	527	96,781	154,868	43,959	26,470

All alternatives, including the No Action Alternative, would manage 7,086 acres as WSAs or under comparable management prescriptions, many of which focus on limiting surface disturbance and other activities that can adversely impact cultural resources. WSAs are closed to leasing under all alternatives. Of the 7,086 acres managed as WSAs, only 348 acres would be located on lands identified as having high cultural resource sensitivity. This is less than 1% of all high sensitivity lands in the CFO.

Table 4-82 provides a comparison between the alternatives of the acreage available or unavailable to minerals development in areas of special designations on lands in the planning area that are identified as having high cultural resource sensitivity. As discussed above, alternatives that exclude or heavily restrict surface disturbance on more acres of land reduce the risk to cultural resources from direct impacts associated with that surface disturbance.

Table 4-82. Minerals Allocations under ACEC Designation by Alternative in High Cultural Sensitivity Areas

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable Minerals					
Open with standard terms and conditions	1,436 (0.1%)*	20,597 (2%)	20,647 (2%)	8,436 (0.7%)	0 (0%)
Open with moderate constraints	0 (0%)	830 (0.07%)	852 (0.07%)	6,449 (0.5%)	0 (0%)
Open with major constraints	4,249 (0.3%)	10,711 (0.9%)	44,054 (4%)	9,944 (4%)	1,485 (0.1%)
Closed	376 (0.03%)	52,998 (4%)	47,746 (4%)	5,743 (0.5%)	3,831 (0.3%)
Salable Minerals					
Open	0 (0%)	20,598(2%)	21,522 (2%)	8,462 (0.7%)	280 (0.02%)
Open with moderate constraints	0 (0%)	24,840 (2%)	19,549 (2%)	6,345 (0.5%)	0 (0%)
Closed	6,061 (0.5%)	39,700 (3%)	72,229 (6%)	15,764 (1%)	5,035 (0.4%)
Locatable Minerals					
Open	71 (<0.001%)	57,555(5%)	56,902 (5%)	12,992 (1%)	0 (0%)
Recommended withdrawal	5,990 (0.5%)	27,561 (2%)	54,698 (4%)	15,686 (1%)	5,036 (0.4%)
Withdrawn/Closed	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

In addition to comparing prescriptions that affect the risk to cultural resources, it is important to consider other differences between the alternatives as they relate to cultural resources. The No Action Alternative and Alternative A would not designate the Maroon Cliffs ACEC, an area of known concentration of cultural resources. Alternatives B, C, and D would designate an 8,659-acre ACEC for the expressed purpose of managing the land for the protection of cultural resources. Under the No Action Alternative, prescriptions would continue to be placed to limit surface disturbance in the Maroon Cliffs area from leasable, salable, and locatable minerals, renewable energy, and ROWs. Similar prescriptions would be implemented under Alternative A, though restrictions on leasable minerals would be slightly less strict than under the No Action Alternative. Under Alternatives B, C, and D the area would be managed under prescriptions that withdraw locatable minerals development, close salable minerals development, and exclude renewables and ROWs. All of these prescriptions would also limit surface disturbance, thereby benefitting cultural resources by reducing the risk of adverse impacts. Under all three alternatives, leasable minerals developed would remain open with major constraints, and travel would be OHV limited. However, as noted previously, while excluding cross-country travel provides a direct benefit to cultural resources, travel on existing routes still poses risks to such resources.

4.2.7.2.11 Impacts of Travel Management Actions on Cultural Resources

The effects of travel management decisions on cultural resources are primarily the result of whether travel is limited to designated routes or is closed. Cross-country travel places cultural resources at risk of surface damage from user-created trails passing over archaeological sites, features, and/or artifacts; increased erosion, which displaces artifacts and destroys features; and increased potential of vandalism and casual collecting of artifacts. No cross-country travel (i.e., open travel) would be allowed under any alternative. As opposed to cross-country travel, travel limited to designated routes provides greater protections for cultural resources by reducing opportunities for inadvertent damage from vehicles unless the existing or designated route passes through or directly adjacent to a cultural resource site or leads directly to a site. Sites farther from designated or existing routes become more difficult to access when cross-country travel is eliminated. However, sites adjacent to existing roads may still experience impacts from erosion, looting, vandalism, or vehicles parking on the side of the road. However, even if travel is restricted to either designated or existing routes, new routes can still be built under all alternatives, and the associated surface disturbance has the potential to directly impact cultural resources. Closing areas to all travel understandably affords the greatest protection to cultural resources.

Table 4-83 compares the acres by alternative for the different travel management categories across all lands in the planning area.

Table 4-83. Acres of Travel Management Categories by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737

As can be seen from Table 4-83, Alternative A, with the most acres closed to travel among the action alternatives, would provide the greatest protection to cultural resources and pose the least risk of long-term adverse impacts. The No Action Alternative would provide the most acres closed to travel and would, therefore, offer the greatest protection to cultural resources.

Table 4-84 compares the acres by alternative for the different travel management categories in areas of the planning area identified as having high cultural resource sensitivity. Alternatives with more acres closed to travel reduce the risk of both direct and indirect adverse impacts to cultural resources from physical disturbance, looting, vandalism, etc.

Table 4-84. Acres of Travel Management Regime by Alternative in High Cultural Sensitivity Areas

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	496,772 (40%)	499,560 (41)	502,633 (41%)	503,067 (41%)	503,067 (41%)
Closed	12,051 (1%)	9,288 (0.8%)	6,215 (0.5%)	5,780 (0.5%)	5,780 (0.5%)

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

As can be seen from Table 4-84, all alternatives would limit travel to designated routes across the vast majority of lands deemed to have high cultural resource sensitivity. Alternative A, with the fewest acres open to travel in high cultural resource sensitivity areas, would provide the greatest protection to cultural resources and pose the least risk of long-term adverse impacts among the action alternatives. The No Action Alternative would have the most acres closed to travel in high sensitivity areas and would have a roughly comparable number of acres limited to designated routes as the action alternatives.

4.2.7.2.12 Impacts of Visual Resource Actions on Cultural Resources

Impacts to cultural resources from VRM decisions are effectively related to the degree to which VRM classifications prohibit or limit other actions that cause surface disturbance or similar activities with the potential for long-term adverse impacts to cultural resources. On a related, but somewhat less frequent basis, the degree to which VRM classification management prohibits or limits aboveground structures that could cause adverse visual intrusions on cultural resources, particularly TCPs and sacred use sites, is also a measure of potential impacts to cultural resources.

Management for VRM Class I conditions is generally the most restrictive relative to developments and actions that could impact cultural resources in that actions that alter the landscape in notable ways are restricted. VRM Class II conditions allow for greater landscape alteration but still provide restrictions on activities with the potential to adversely impact cultural resources. Other VRM classes allow for greater levels of landscape alteration and are, therefore, less beneficial to cultural resources. However, it is inappropriate to assume that management for lesser VRM conditions automatically places cultural resources at risk of adverse impacts; management for those conditions does not directly mandate or dictate the frequency or extent of those activities that could impact cultural resources. That is, alternatives that would manage an area at a lower VRM classification only allow landscape altering activities to occur. The actual number or size of any such alterations would be a function of land use applications submitted to the BLM for those lower VRM areas. As such, this analysis only compares the relative degree to which cultural resources would benefit from VRM Class I and II management (see Table 4-85).

Table 4-85. Acres by VRM Management Class for Each Alternative

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Total	***50,671***	***273,710***	***357,802***	***67,962***	***48,263***

Table 4-86 compares the acres by alternative for VRM Class I and II management categories in areas of high cultural resource sensitivity. As can be seen from Table 4-86, Alternative B would provide the greatest long-term protection to cultural resources by managing the most land in high cultural sensitivity areas for visual resources in a way that prohibits or limits surface-disturbing activities that could otherwise adversely impact such resources. The No Action Alternative would manage the least amount of land in high cultural resource sensitivity areas under these VRM management conditions, thereby providing the least indirect benefit to cultural resources.

Table 4-86. Acres by VRM Management Class for Each Alternative in High Cultural Sensitivity Areas

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	348 (0.03%)*	2,545 (0.2%)	4,988 (0.4%)	348 (0.03%)	348 (0.03%)
Class II	20,920 (2%)	56,545 (5%)	79,140 (6%)	26,826 (2%)	19,187 (2%)
Total	***21,268 (2%)***	***59,090 (5%)***	***84,128 (7%)***	***27,174(2%)***	***19,535 (2%)***

* Percent of all surface and subsurface lands in the planning area with high cultural resource sensitivity.

4.2.8 Paleontological Resources

This section discusses impacts to paleontological resources from management decisions proposed in Chapter 2. Existing conditions concerning paleontological resources are described in Section 3.2.9. Actions proposed under each of the alternatives for other resources and resources uses that have the potential to impact paleontological resources are analyzed below. Analysis of potential projects is based on professional judgment regarding approximate project locations, general locality conditions, and design features commonly applied to such projects. The analysis contained below does not definitively determine the outcomes resulting from implementation of any site-specific projects.

4.2.8.1 Analysis Methods

4.2.8.1.1 Indicators

The term paleontological resource refers not only to the condition of individual fossils but also to the relationship between fossils and their stratigraphic context (i.e., their association with the geologic layer in which they became fossilized). Fossil integrity is important for the accurate taxonomic classification of individual specimens, including identification of the genus or species represented. Contextual integrity is critical for proper age assessments of fossil localities. Physical disturbance that results in destruction of fossils or removal from their stratigraphic context diminishes or destroys the scientific, educational, and recreational value of paleontological resources. The specific quantity of paleontological resources impacted or protected would be a useful indicator for the analysis contained in this section, yet data at the appropriate scale are not readily available for all known localities within the region and not obtainable for unknown paleontological resources (i.e., those yet to be discovered, including those in the subsurface).

The Potential Fossil Yield Classification (PFYC) system, as described in Section 3.2.9 is a useful tool for analyzing potential impacts to paleontological resources at the land use planning level. The BLM has classified all 23 mapped geologic units within the planning area according to the PFYC (see Table S.18 in Appendix S). Although this geologic map is at a larger scale (1:500,000) than most spatial data, it is currently the best available source of mapped bedrock geology for the planning area and is suitable for landscape-scale analyses. The acreage, summarized for PFYC Classes 2, 3, and 4, is provided Table 4-87.

Table 4-87. Acres of BLM-administered Surface Underlain by PFYC Classes 2–4 Based on Mapped Geologic Units

PFYC	Class 2	Class 3	Class 4
Acres	2,146,228	631,245	6,751

Acres of land that could be impacted by individual resource management decisions and associated uses were used as an indicator to assess each alternative's potential impact to paleontological resources. Where applicable, specifically for leasable minerals and ACECs, the spatial footprints of use allocations and management actions that may impact fossil resources were digitally intersected with the PFYC spatial dataset. For those resource uses (leasable minerals and ACECs), acres of impact by PFYC Class were used as impact indicators because these decisions have the greatest potential to impact paleontological resources.

4.2.8.1.2 Methods and Assumption

Paleontological resources are considered to be a surface resource, and impacts to these non-renewable resources from surface and subsurface disturbance are permanent. Adverse effects on paleontological resources occur if an action or development causes direct or indirect damage to or destroys important paleontological resources that could yield information important to prehistory or that embody the distinctive characteristics of a type of organism, environment, period of time, or geographic region. If unmitigated, adverse impacts would result from disturbances of paleontologically sensitive geologic units and from actions that increase access to areas containing scientifically important fossils, thus increasing the potential for unauthorized collection and vandalism.

Important paleontological resources are almost always contained in the bedrock rather than in well-developed soil horizons or more recent alluvial material. Adverse effects on paleontological resources from surface-disturbing activities occur primarily at the time of initial surface disturbance. Therefore, the analysis method uses estimated acreage (or mileage) of surface disturbance to quantify impacts to paleontological resources, except for leasable minerals and proposed ACECs. For those resource uses, spatial allocations are compared with mapped PFYC data to quantify impacts to Classes 2, 3, and 4 areas in the planning area. Currently, there are no PFYC Class 5 geologic units in the planning area.

Proactive paleontological resources management can offset or reduce the risk of impacts to the resources through appropriate mitigation (e.g., pre-project assessments, surveys, construction monitoring, and fossil collection), as well as increase public benefit. In addition, inventories required before surface disturbance in paleontologically sensitive areas would result in the identification and evaluation of previously undiscovered paleontological resources. The BLM would then manage these resources using scientific expertise and principles, which would include avoidance and/or collection prior to surface-disturbing activities.

Regardless of the management actions, important paleontological resources would continue to be found in the planning area, either in areas of natural erosion and exposure or through mitigation of surface-disturbing activities.

4.2.8.2 Direct and Indirect Impacts

Impacts analyzed here include direct and indirect impacts of the proposed management actions. Impacts to paleontological resources result from natural weathering and erosion and from surface disturbance caused by people or animals. Where applicable, the short- or long-term nature of these impacts is described. Short-term effects would occur at the time of disturbance and up to 5 years following disturbance, before full revegetation and soil stabilization. Long-term effects could occur beyond 5 years as a result of erosion that might be associated with altered drainage patterns or reclamation efforts that are not effective in soil and landscape stabilization. This erosion could lead to accelerated exposure and subsequent damage to or loss of fossils and their geographic and stratigraphic contexts.

In general, for project areas that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance (depth and lateral extent), the higher the potential for adverse impacts to paleontological resources. For project areas that are directly underlain by geologic units with low paleontological sensitivity, there is little potential for impacts on paleontological resources unless highly sensitive geologic units are underlying the low sensitive unit are also impacted.

Alternatives that include actions that would affect the bedrock could directly affect paleontological resources by physically altering, damaging, or destroying paleontological resources or their contextual settings. Alternatives that would increase or make access easier also could have an increased risk of indirect effects, including vandalism, theft of materials, and inadvertent physical damage to paleontological resources or their settings. Finally, disposing of lands containing paleontological resources would remove those resources from public ownership, which would mean the loss of any federal legal protections for those resources and the loss of opportunities for public collecting or education. Conversely, actions that result in data collection and preservation of paleontological resources through research or applied mitigation efforts impact paleontological resources in a positive way, as associated data would be available into perpetuity for further research and education. Acquiring lands with paleontological resources also would be beneficial to the public by providing important protections for paleontological resources and increasing opportunities for education and casual collecting. Surface disturbance would be expected to result in short- and long-term adverse effects on paleontological resources.

Impacts result from activities planned or authorized by the BLM and occur at the same time and place as a surface-disturbing action. Direct adverse impacts on paleontological resources primarily concern the potential physical damage, destruction, or other loss of non-renewable paleontological resources and the contextual information associated with these resources. Ground disturbance has the potential to adversely impact an unknown quantity of fossils that may occur on or underneath the surface in areas containing

paleontologically sensitive geologic units. Without mitigation, these fossils, as well as the paleontological data they could provide, could be destroyed, rendering them permanently unavailable for future scientific research or public education, including display. It is likely that some paleontological resources would be destroyed during surface-disturbing activities because they would not be seen or recovered. This would primarily be a function of the large size of machinery being used, the larger volume of material being disturbed or removed, and the relatively small size of many fossils. Beneficial impacts to paleontological resources occur when disturbance results in the discovery of paleontological resources that would not have otherwise been discovered and mitigation salvage measures are implemented. These newly discovered paleontological resources then become available for scientific analysis and permanent preservation in a public repository; positive impacts may include advances in scientific knowledge, contributions to public education and interpretation, and community involvement and partnerships. Increased public access via roads and trails to a previously inaccessible area increases the risk of unauthorized paleontological resource collecting or vandalism.

Proactive paleontological resources management can offset or reduce the risk of impacts to the resources through appropriate mitigation (e.g., pre-project assessments, surveys, construction monitoring, and fossil collection), as well as increase public benefit. Pre-authorization investigations, including pedestrian surveys, can only use surface observations of proposed disturbance areas; therefore, all potential impacts to subsurface resources are not known prior to disturbance. While subsurface impacts are similar, some actions (e.g., major transmission lines, buried gas pipelines, and road construction) require substantial subsurface excavations that may further impact buried paleontological resources due to the depth of disturbance.

Management actions related to air quality, health and safety, and noxious weeds would not impact (i.e., remove paleontological resources from their stratigraphic context) or increase the risk of impact (i.e., disturb paleontologically sensitive geologic units or increase access to these units); therefore, these resources are not further analyzed. While many of the actions designed to maintain and manage cave and karst resources, vegetation and riparian resources, cultural resources, soils, special status species, water resources, and wildlife and fish would not impact paleontological resources, the management of ground disturbance would indirectly reduce impact or impact risk to paleontological resources by preserving fossils in their stratigraphic context and limiting access to paleontologically sensitive areas. Although resource management decisions vary between alternatives (see each respective resource section), these resources or resource uses are not further analyzed as the decreased risk of impact (e.g., acres closed to disturbance) is not substantially different between alternatives. In addition, management actions (e.g., no surface disturbance, no access) that reduce or limit access or activities associated with paleontological research are not considered to be an impact to paleontological resources, instead it is considered to be an impact to the research or researcher and is not analyzed in the following sections.

Impacts or risk of impact from the proposed management actions of land tenure, land use authorizations, livestock grazing, mineral allocations (leasable, salable, locatable), lands with wilderness characteristics, recreation, renewable energy, special designations (ACECs, WSRs, WSAs, backcountry byways), travel management, and VRM on paleontological resources under each alternative are summarized in the following sections. While in most cases the types of projected impacts to paleontological resources under the alternatives are similar, the intensity of these effects would vary by alternative based the amount (e.g., area, length, volume) of paleontologically sensitive geologic units that could be impacted. Some impacts are expressed qualitatively because the analyses of these management actions do not reflect specific actions that are quantifiable at this time. Quantitative analyses are included where possible based on estimates of reasonably foreseeable actions described below. In most cases, subsequent site-specific analyses would be required to implement resource management decisions. These analyses would address potential site-specific impacts on a variety of resources, including (if appropriate) paleontological resources. More detailed or locality-specific studies and appropriate environmental documents would be prepared in compliance with NEPA and its implementing regulations, as well as BLM policy, as required.

4.2.8.2.1 Impacts of Livestock Grazing Actions on Paleontological Resources

Actions related to livestock grazing under all alternatives could have long-term direct and indirect adverse impacts on paleontological resources. If grazing occurs in areas containing occurrences of surface fossils, livestock could adversely affect paleontological resources. This is because damage or destruction of surface fossils is known to occur directly as a result of trampling by livestock where animals range across exposures of fossiliferous geologic units. In addition, the potential for adverse indirect impacts may increase in areas where animals congregate (e.g., fences, water sources, salt blocks, bedding areas, and along animal trails). Indirect adverse impacts to paleontological resources may result if grazing locations are modified (e.g., due to land closures), as changes in movement patterns may result in the development of new or modified travel routes across previously undisturbed land. Managing livestock grazing to improve or maintain desired range conditions would maintain vegetative cover and soil stability, and thereby prevent the indirect exposure and deterioration of paleontological resources.

While the types of adverse impacts to paleontological resources from livestock grazing management actions (e.g., grazing and associated improvements) are the same, the magnitude varies between alternatives as the total acres of BLM-administered land open to grazing varies (see Table 4-88).

Table 4-88. Acres Open to Proposed Livestock Grazing Actions by Alternative

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open (acres)	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
% Open	***99.7%***	***76.4%***	***92.7%***	***99.6%***	***99.8.0%***

In addition to impacts from livestock, range improvements requiring surface disturbance (e.g., new fences, stock ponds) could directly damage or displace paleontological resources if they are located in areas underlain by potentially fossiliferous geologic units, as with any type of surface disturbance (e.g., construction).

Generally, through mitigation, those areas where improvements are planned and have the potential to contain or are known to contain paleontological resources could be protected from damage by placing rangeland fences and other proposed improvements away from fossil localities or exposures of paleontologically sensitive geologic units. Inventory and mitigation procedures in these areas would protect most paleontological resources from substantial damage. In addition, the documentation and collection of surface fossils and associated data, and the transfer of all collected fossils to a public museum for curation and permanent storage would be beneficial to paleontological resources.

4.2.8.2.2 Impacts of Recreation Actions on Paleontological Resources

The primary framework for recreation management in the planning area is under SRMAs and ERMAs. RAMPs would be prepared for all designated SRMAs to address levels and types of management actions necessary to achieve the recreation objectives. Areas outside the SRMAs and ERMAs, while not specifically emphasized, are available for recreation as long as the activities are not in conflict with the primary uses of these lands.

The management goals and objectives for recreation would have both adverse and beneficial long-term effects (or risk of impact) on paleontological resources. Promoting and managing recreation throughout the planning area could increase incidental or purposeful disturbance of paleontological resources. Unauthorized disturbance would result in displacement or loss of the paleontological resource involved. Displacement of paleontological resources adversely affects the potential to understand the context of the locality and limits the ability to extrapolate data. Facilitating use of recreation would result in increased surface-disturbing and disruptive recreational activity and the loss of vegetative cover, which would increase the potential to expose and destroy paleontological resources.

Direct impacts on paleontological resources resulting from recreation decisions would be related to the level of surface disturbance associated with recreational development, such as the construction of recreational facilities including roads, and with the degree of increased human activity in paleontologically sensitive areas/geologic units. Potential long- and short-term indirect impacts would also result from increased levels of unauthorized collecting and associated vandalism that could accompany increased human activity. Management actions for recreation also have the potential to benefit paleontological resources. By implementing public education and environmental awareness programs, such as the BLM's "Tread Lightly and Leave No Trace Program," newly added recreational activities in the CFO planning area would theoretically reduce illegal fossil collection, vandalism, or accidental destruction.

In addition, regulated recreational use of areas tends to provide better protection to paleontological resources than does unregulated use. Although collecting common invertebrate and plant fossils for personal, non-commercial use is an accepted, low-impact use of public lands, which could foster a greater overall appreciation for paleontological resources and their scientific significance, developed recreation sites (SRMAs and ERMAs) are closed to recreational fossil collection (see 43 CFR 8365.1-5(b)). This closure would reduce potential adverse impacts on paleontological resources that could occur as a result of extensive repeated use at these localized locations.

Under the No Action Alternative, a Cave Resources SRMA covering 8,626 acres is designated, which provides some protection to the paleontological resources known to occur in these areas. However, under all action alternatives this area would be designated as part of the Cave Resources ACEC (19,625 acres), which would add additional protection through management prescriptions and decreased encouraged recreation use, thereby limiting the amount of indirect and direct impacts from increased access.

While the Hackberry lake SRMA designation would occur under all alternatives, under the No Action Alternative it would be slightly larger, incorporating a known paleontological site, which may be left open to additional surface disturbance as compared to the action alternatives.

There are differences in total SRMA and ERMA acreage totals between alternatives (Table 4-89); however, since the overall surface acreage is being used as the indicator of impact to paleontological resources in this section, differences by individual SRMA or ERMA are not critical to this discussion. The greatest overlap between known paleontological resource locations and recreation is at the Pecos River ERMA and Hackberry Lake SRMA, specifically along the Pecos River trails and within the Dunes RMZ. While the outline of the Hackberry Lake SRMA varies between the No Action Alternative and all of the action alternatives, the Pecos River trails and Dunes RMZ have management common to all alternatives to ensure protection of paleontological resources.

Table 4-89. Proposed Acres within Recreation Management Areas on BLM lands Summarized by Alternative

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
ERMAs*	-	2,975	26,564	17,302	9,456
SRMAs	69,469	49,991	49,988	49,669	49,673
Total ERMAs and SRMAs	69,469	52,966	76,552	63,971	59,129
Approx. % CFO acres within ERMAs or SRMAs	3.3%	2.5%	3.6%	3.1%	2.8%

*Under the No Action Alternative all areas that would not be designated as SRMAs are considered ERMAs, which includes most of the planning area.

Management of individual resources/resource use within the SRMAs and ERMAs vary by alternative; this is specifically evident in the management of leasable minerals (Table 4-90). Details about others are not specifically provided here because they are covered in detail within their respective sections (see Minerals – Locatable, Minerals – Salable, VRM, Renewable Energy, Grazing, and Travel).

Table 4-90. Acres and Percent of ERMAs and SRMAs Open to Leasable Minerals by Alternative

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable: open with standard terms and conditions	1,477/2%	1,533/3.0%	4,596/8.7%	1,544/2.3%	1,533/2.6%
Leasable: open with moderate constraints (CSU)	48,450/71%	39,851/75%	45,791/60%	49,769/74%	45,529/77%
Leasable: open with major constraints (NSO)	6,006/9.0%%	9,483/18.0%	19,389/25.3%	14,219/21.2%	11,863/16.20%
Leasable: closed	13,534/20%	2,099/4.0%	6,776/9.0%	1,439/2.1%	204/0.34%

4.2.8.2.3 Impacts of Travel Management Actions on Paleontological Resources

All BLM-administered lands would have travel management designations of open, limited to designated routes, OHV limited, or closed. Open areas, characterized by unrestricted motorized travel, would show impacts to the integrity of paleontological resources as cross-country motorized vehicle use, in particular, is known to impact soils through compaction, vegetation removal, and accelerated erosion. When exposed geologic units contain paleontological resources, vehicle use can damage or destroy the paleontological resources through direct impact and cause their displacement, damage, and accelerated weathering due to exposure.

The impacts to areas where travel is limited to designated and existing routes depend on the existing conditions, as most unimproved two-track roads and vehicle routes in the planning area have not been examined for the presence of paleontological resources. Therefore, the use of these unimproved routes could disturb or displace paleontological resources within the roadways. Travel on or use of improved routes would not directly impact paleontological resources because these routes have previously been stabilized (e.g., capped) and paleontological resources are likely not exposed.

Closed areas, assuming compliance and enforcement, would have a very low potential for motorized vehicle effects. In addition, if locations within closed areas are required for necessary tasks, because these are typically casual one-time use by OHVs, there would be very little increase in erosion, which typically is the result of repeated travel. If a vehicle drives directly on paleontological resources they could be damaged or destroyed, but this would be an extremely rare occurrence.

Generally, creation, substantial improvement or maintenance work, and reclamation of travel infrastructure such as roads, trails, and trailheads would be associated with construction-related surface disturbance that could adversely affect paleontological resources by directly exposing or moving paleontological resources from their stratigraphic context or by damaging the paleontological resource itself. In addition, the designation of new routes for motorized and non-motorized travel would facilitate access to areas that were previously prohibited, remote, or inaccessible. This would also increase the potential for adverse direct impacts on surface fossils in paleontologically sensitive geologic units. The overall increase in public access to BLM-administered lands associated with travel decisions would increase the potential for adverse effects, such as unauthorized fossil collecting (poaching), vandalism, and inadvertent physical damage, on previously remote paleontological resources.

Because the acres by designation type vary by alternative the magnitude of impact or impact risk varies as well Table 4-91.

Table 4-91. Proposed Acres per Travel Management Decisions by Alternative

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Limited to designated	-	–	–	–	–
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737

As with other management actions, potential adverse impacts could be offset through mitigation identified at the project implementation level. Regardless of the specific methods, mitigation in and of itself would be a beneficial impact because it would result in the authorized and scientific collection of paleontological resources that may otherwise never have been discovered and their preservation in a public museum where they would be available for scientific research and education.

4.2.8.2.4 Impacts of Land Use Authorizations Actions on Paleontological Resources

Land use authorizations, specifically major (intrastate pipeline or transmission) and minor (roads, power lines, and pipelines for oil and gas fields) ROWs, are subject to project-specific NEPA compliance, including an assessment of potential impacts to paleontological resources, prior to authorization. Direct impacts to paleontological resources would primarily occur as a result of surface and subsurface disturbance during active construction, as well as from erosion until disturbed areas are reclaimed and stabilized. Pre-authorization investigations, including pedestrian surveys, can only use surface observations of proposed disturbance areas; therefore, all potential impacts to subsurface resources are not known prior to disturbance. The types of subsurface impacts are similar for all ROWs, although major transmission lines, interstate pipelines, and road construction in particular require substantial subsurface excavations that may further impact buried paleontological resources due to the depth of disturbance. In addition, surficial pipelines would have a lower impact or risk of impact to paleontological resources because the volume of disturbed sediment or bedrock would be lower than for a buried line. The collocation of ROWs would decrease the risk of impact to paleontological resources because the overall amount and locations of disturbance access to previously remote or inaccessible areas would be less. The risk of adverse indirect impacts on paleontological resources would occur from the ongoing operations and presence of access infrastructure on BLM-administered lands by increasing access to lands that were previously inaccessible or remote, thus increasing the likelihood of unauthorized fossil collecting and vandalism.

The types of impacts from land use authorization actions, as outlined above, are similar among all alternatives. Management decisions that vary between alternatives include denoting areas where development has the potential to occur and exclusion areas where development would not be authorized, as well as specifics on buffers, surficial pipelines conditions, and corridors; however, a summary of acres open and closed is not available at this time. While a quantitative analysis is not possible, generally the risk of direct adverse impacts increases with the total amount (i.e., combination of surficial acreage and the subsurficial volume) of paleontologically sensitive geologic units disturbed (PFYC Class 3 and 4), and the risk of indirect adverse impacts would increase with additional access to previously remote (or inaccessible) areas. Impacts and impact risk would be offset by assessment and mitigation, if deemed necessary at the project implementation level. Beneficial impacts vary ultimately with the number of paleontological resources documented, collected, and made available to the public for future research, education, and display that may not be recovered without disturbance.

4.2.8.2.5 Impacts of Visual Resource Actions on Paleontological Resources

Where VRM Class I and II areas (Table 4-92) contain paleontological sensitive geologic units, VRM decisions that control and limit surface disturbance would directly affect the risk of impacts to paleontological resources. In locations where surface-disturbing activities are reduced, controlled, or eliminated, VRM decisions would directly reduce the risk of removing paleontological resources from

stratigraphic context and direct physical damage to or destruction of these resources. Indirect beneficial impacts would include a reduction in the risk of vandalism and looting that result from improved access.

Table 4-92. Amount of VRM Class I and II by Alternative on BLM-administered Lands Only

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
% Class I and II	2%	10%	13%	2%	2%
Total	***2,783,858***	***2,783,514***	***2,783,481***	***2,783,558***	***2,783,585***

4.2.8.2.6 Impacts of Minerals Actions on Paleontological Resources

Management actions related to mineral development would provide for a variety of mineral exploration and development activities for leasable (e.g., fluids – oil and gas; solids – potash and sodium), locatable (e.g., gypsum, copper, gold, uranium), and salable minerals (e.g., building stone, sand, gravel). Total acres per mineral category are provided in Table 4-93. In addition, due to the high frequency of leasable exploration and development, the leasable mineral category is analyzed quantitatively using the PFYC and a summary of the acres open and closed to leasable mineral actions by PFYC designation and alternative is provided in Table 4-94.

Mineral exploration (e.g., geophysical surveys) and development (e.g., grading, excavations, trenching) activities typically involve large amounts of surface and subsurface disturbance; therefore, the risk of impacts to paleontological resources increases with the acres open to surface disturbance, as well as by the estimated depth of the action. This is because surface-disturbing activities associated with mineral exploration could damage or destroy surface and subsurface paleontological resources, as well as remove them from their stratigraphic context. In addition, after initial exploration and development, the ongoing operations of facilities and presence of associated infrastructure (e.g., access roads) would have adverse impacts on paleontological resources by increasing access to lands that were previously inaccessible through new road development, thus increasing the likelihood of unauthorized fossil collecting and vandalism. These impacts are most likely to occur in paleontologically sensitive units, which are designated as PFYC Class 3, 4, and 5. Therefore, the sensitivities of geologic units and surface acreage eligible for minerals exploration and development are of critical consideration when analyzing potential impacts to paleontological resources. Because the acres by designation type vary by alternative, the magnitude of impact or impact risk varies as well (see Table 4-93 and Table 4-94).

Table 4-93. Acres and Percent of Total Acres Open to Salable and Locatable Mineral Development

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Salable					
Open	2,637,465	1,160,064	1,121,118	1,784,431	2,028,324
Avoid (open with special terms and conditions)	–	1,062,192	726,270	752,286	602,621
% Open	95%	42%	40%	64%	73%
% Open with special terms and conditions)	0%	38%	26%	27%	22%
Locatable					
Open to mineral entry	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
% Open	99%	86%	76%	95%	96%

Table 4-94. Acres Open to Leasable Mineral Development

Management Decision	PFYC	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Closed	Class 2	117,201	353,980	39,446	39,446	35,637
	Class 3	57,190	407,417	415,198	49,056	49,050
	Class 4	0	0	527	0	0
Open	Class 2	1,123,089	924,706	871,375	1,259,322	1,453,137
	Class 3	470,987	213,380	213,389	486,609	539,048
	Class 4	603	472	588	603	603
Open with major constraints (NSO)	Class 2	51,949	79,782	161,421	157,248	69,399
	Class 3	2,126	139	0	550	139
	Class 4	603	472	588	603	603
Open with moderate constraints (CSU)	Class 2	853,990	787,708	446,121	690,057	587,944
	Class 3	100,942	10,334	2,675	94,970	42,991
	Class 4	1,403	1,606	963	1,349	700

4.2.8.2.7 Impacts of Special Designation Actions on Paleontological Resources

Management of special designations would have beneficial impacts on paleontological resources by reducing the risk of surface disturbance. For the purpose of this analysis, special designations fall into four categories: ACECs, WSRs, WSAs, and backcountry byways, and where applicable individual areas are discussed.

To the extent that special designations in paleontologically sensitive areas result in restricted public access and use, and prohibit surface-disturbing actions, paleontological resources would be less likely to be unlawfully collected or vandalized, or damaged or destroyed by vehicular traffic or construction. Therefore, in this general sense, special designations represent a beneficial impact on paleontological resources because they lessen the probability of removing them from stratigraphic context. If public access to special designation areas such as ACECs, WSRs, and backcountry byways is encouraged and surface-disturbing actions are permitted, adverse direct and indirect impacts to paleontological resources could occur.

Special designations vary by alternative, and therefore acres or miles managed for reduced surface disturbance and increased access varies (Table 4-95).

Table 4-95. Acres or Miles Managed as Special Designations under Each Alternative

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
ACEC (acres)	13,435	495,042	561,433	98,562	28,894
WSR (miles)	0	11.89	3.67	3.67	3.67
WSA (acres)	7,086	7,086	7,086	7,086	7,086
Backcountry byways (miles)	55	64.5	64.5	55	55

ACECs

Of the 16 proposed ACECs, three—Boothill, Gypsum Soils, and Chihuahuan Desert Rivers (which overlies Gypsum Soils)—include paleontological resources as a relevant and important value. Even though the Cave Resources area does not include paleontological resources as a relevant and important value, they are known to occur within these locations. In addition, six ACECs (Birds of Prey, Laguna Plata, Lonesome Ridge, Maroon Cliffs, Salt Playa, and Six Shooter Canyon) are underlain by moderate to highly sensitive (PFYC Class 3 and 4) geologic units.

The special management actions specifically associated with the Cave Resources ACEC would protect paleontological resources from development and deterioration and ensure their availability for scientific research and education. A management decision to designate Cave Resources as an ACEC would help preserve the integrity of the fossil deposits, while a decision not to designate would remove protection, potentially exposing the fossils to damage and loss.

As described in the impacts of mineral actions on paleontological resources section lands that are open to mineral development and therefore surface disturbance are more likely to incur impacts to paleontological resources. Table 4-96 shows the number of acres and the associated percentage of lands within ACECs that are open to mineral development.

Table 4-96. Acres and Percent of Acres by Mineral Management Decisions within the ACECs by Alternative

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable					
Open	1,438/10.6%	71,191/14.3%	61,907/11.0%	33,947/34.4%	–
Open with moderate constraints (CSU)	–	1,389 0.28%	4,732/0.84%	19,932/29%	–
Open with major constraints (NSO)	4,735/35.2%	22,870/4.6%	98,534/17.5%	16,562/16.8%	9,766/33.8%
Closed	7,262/53.7%	399,592/80.7%	396,260/70.5%	28,120/28.5%	19,127/66.2%
Salable					
Open	822	71,286/14.4%	64,536/11.4%	33,973/34.4%	–
Avoid (open with moderate constraints)	–	226,119/45.6%	198,518/35.3%	19,766/20%	2,424/8.4%
Closed	12,613 (93.9%)	197,644/40%	298,343/53.1%	44,824/45.5%	26,468/91.6%
Locatable					
Open	1	398,081/80.4%	406,383/82.1%	54,689/55.4%/	2,424/8.4%
Withdrawn	13,434	96,781/19.5%	154,915/27.6%	43,878/44.5%	26,470/91.6%

WSRs

No WSRs are recommended suitable under the No Action Alternative, two are recommended under Alternative A, and one is recommended under Alternatives B, C, and D.

Recommended suitable only under Alternative A, the Delaware River area is the only WSR that includes paleontological resources as an outstandingly remarkable value. The special management actions of resource use (e.g., mineral allocations, travel, VRM, ROW) within the Delaware River WSR would reduce the potential for surface disturbance. In areas underlain by paleontologically sensitive geologic units, reductions in surface disturbance would decrease the risk of impacts to paleontological resources because they would be less likely to be removed from their stratigraphic context. Under all other alternatives, the Delaware River would not be recommended suitable as a WSR, thereby not limiting surface disturbance in the immediate area or adding further protection for in situ paleontological resources.

The Black River area would be recommended suitable under all action alternatives. Management decisions for the Black River area would reduce surface disturbance and help preserve paleontological resources, while a decision not to designate would remove protection, potentially exposing the fossils to damage and loss.

An increased risk of negative impacts to paleontological resources could occur within designated areas due to increased access and use. However, this would be offset by paleontological resource management actions.

WSAs

Under the No Action Alternative, all four WSAs (McKittrick, Mudgetts, Lonesome Ridge, and Devil's Den) would be managed according to BLM Manual 6330-Management of Wilderness Study Areas until they are either designated or officially removed from interim management. As such they would be closed to most surface-disturbing activities and paleontological resources would not be impacted.

Management to preserve wilderness values would reduce the potential for surface disturbance, and in areas underlain by paleontologically sensitive geologic units, reductions in surface disturbance would decrease the risk of impacts to paleontological resources because they would less likely to be removed from their stratigraphic context.

Under the No Action Alternative, if the WSA status is removed, the lands would still be managed as open with major constraints or closed to mineral development, excluded from renewable energy development and be categorized as ROWs avoidance areas as per management prescribed in the Carlsbad RMP (1988) and the Carlsbad RMP Amendment; while under all action alternatives except for Alternative D they would receive the same protections as under the No Action Alternative. Under Alternative D they would still be managed as open with major constraints to oil and gas development and excluded from renewable energy development but would be open with moderate constraints for salables and open to locatable development. These actions would increase the potential for surface disturbance as compared to the No Action Alternative and Alternatives A-C and increase the risk of impacts to paleontological resources.

Backcountry Byways

The Guadalupe Backcountry Byway would be managed under all alternatives per the 1995 Guadalupe Backcountry Byway Plan (BLM 1995); under the action alternatives, additional actions would be taken to promote education, safety, and impact prevention, including visual resources. Under Alternatives A and B, the Dark Canyon Road Loop would be proposed; while not proposed under the other alternatives, this area would have similar management decisions.

For both backcountry byways, management to preserve the visual and educational values would reduce the potential for surface disturbance, and in areas underlain by paleontologically sensitive geologic units, reductions in surface disturbance would decrease the risk of impacts to paleontological resources because they would less likely to be removed from their stratigraphic context.

An increased risk of negative impacts to paleontological resources could occur within designated areas due to increased access and use, which could occur with the continued development and promotion of the Guadalupe Backcountry Byway under All Alternatives and for the proposed Dark Canyon Road Backcountry Byway specifically under Alternatives A and B. However, this would be offset by paleontological resource management, public education, and appropriate signage.

Impacts of Renewable Energy Actions on Paleontological Resources

Commercial renewable energy (e.g., wind and solar) development and associated access could have direct and indirect adverse impacts on paleontological resources. Surface- and subsurface-disturbing activities (e.g., clearing, grading, and excavations) associated with exploration and development of renewable energy projects could directly damage or destroy surface and subsurface fossils. The ongoing operations of commercial renewable energy facilities would increase the risk of indirect adverse impacts on paleontological resources by increasing access to lands that were previously inaccessible, and thus increasing the likelihood of unauthorized fossil collecting and vandalism. The effects of both wind energy and solar development are covered in detail in their respective Programmatic EISs (BLM 2005; BLM and U.S. Department of Energy 2010) and include details about direct and indirect impacts resulting from initial site characterization, facility construction, operations, and decommissioning.

Although paleontological resources vary in occurrence and density by site, impacts on these resources can be offset through project specific assessment and mitigation identified during the project implementation phase, because these actions would ensure that potential impacts are identified and addressed.

The types of impacts from renewable energy management actions, as described above, are similar between alternatives. However, the risk of direct adverse impacts increases with the total amount (e.g., combination of surficial acreage and the subsurficial volume) of disturbance and the risk of indirect adverse impacts increase with access to previously inaccessible areas. Surficial acreage by alternative and management type is provided in Table 4-97. Indirect beneficial impacts to paleontological resources vary ultimately with the number of new paleontological resources documented, collected, and available to the public for future research, education, and display.

Table 4-97. Proposed Acreage for Combined Renewables (including geothermal, solar, and wind) Management Actions by Alternative on BLM-administered Lands Only

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Geothermal: open	964,322	1,788,890	1,411,281	2,175,070	2,319,907
Solar: variance	271,316	1,323,157	1,257,870	1,356,451	1,460,801
Wind: open	1,134,948	800,762	760,560	1,002,986	1,092,311
Wind: avoid	949,539	624,734	418,812	883,051	926,749
Geothermal: close	1,819,929	995,285	1,372,791	608,850	464,187
Solar: exclude	1,820,409	768,020	833,305	734,636	630,302
Wind: exclude	7,056	666,783	912,860	206,184	73,143

Impacts of Land Tenure Actions on Paleontological Resources

Fossil resources belong to the surface land owner because they are considered part of the surface estate (BLM Manual 8720). When lands containing fossil deposits leave federal ownership, through sale or exchange, any protections afforded them by federal laws and regulations are dissolved. Disposal of BLM-administered surface through sales, exchanges, or any other title transfer with known or previously undocumented paleontological resources to private ownership would have long-term indirect and cumulative adverse impacts to paleontological resources because of the lack of protective measures for privately owned land, as well as by removing scientifically significant fossils from the public domain, thus rendering them permanently unavailable for scientific research and education.

Conversely, acquiring lands in the planning area would have a beneficial effect on paleontological resources because of the protective measures offered under federal ownership. Lands could be acquired through direct purchase, legislative mandates, donations, condemnations, or exchanges. Resource values could be included in the identification of desired parcels, so important paleontological resources could be targeted for acquisition. If resources were present and paleontological resources were thus brought under BLM management, these actions would have potential direct, long-term beneficial effects on paleontological resources. In addition, land acquisitions by the BLM could affect paleontological resources by increasing public access to areas that contain paleontologically sensitive geologic units and areas that contain fossil localities. Public access to these areas could result in an adverse impact by increasing the risk of unauthorized collection or vandalism of paleontological resources. However, a simultaneous beneficial effect would be the opportunity for the BLM to establish stewardship of paleontological resources on these newly acquired lands. This stewardship could include access to these lands by permitted paleontological researchers and the resulting associated educational benefits, including interpretive opportunities and the permanent storage of scientifically significant fossils collected in public museums.

According to general guidance for land tenure transactions acquiring land with known paleontological importance is a priority for acquisition in all of the action alternatives, but not under the No Action Alternative. Criteria for consideration when contemplating disposal of public land are identified in the action alternatives. While the types of impacts from land tenure actions are the same among all alternatives, the magnitude of the negative impacts vary inversely, as a result of the total surficial acreages available for disposal (Table 4-98). The No Action Alternative has the highest potential for adverse impacts based on acreage allotted for disposal. Beneficial impacts vary directly by the acres available for acquisition, as long as paleontological resource on the acquired lands are managed and protected in proportion to the risk of increased access to these areas. At present, there are no acquisitions pending specifically for paleontological values. Based on current information, all action alternatives have nearly equal negative and positive impacts.

Table 4-98. Proposed Acreage for Disposal under Land Tenure Management Actions by Alternative

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
218,318	18,703	26,125	31,536	51,579

As noted above for all of the action alternatives, paleontological resources are included as one of the potential benefits of land acquisition. Although paleontological resources are not specifically listed as a characteristic of lands to be retained under any alternative, any proposal would be analyzed through the NEPA process and include a review of paleontological resources. If it is determined after a standard paleontological resource evaluation that paleontological resources are present, the parcels could be on a case-by-case bases removed from the disposal or considered for other protective actions.

Impacts of Lands with Wilderness Characteristics Actions on Paleontological Resources

Prescriptions for lands with wilderness characteristics that manage to protect wilderness characteristics would generally have long-term beneficial impacts on paleontological resources that occur within their boundaries because these lands would be managed to protect their wilderness values by reducing the potential for surface disturbance, which would also preserve paleontological resources. Decisions under this management would include being closed or NSO to mineral leasing, closed to salables, and recommended for withdrawal for mineral entry.

When units are managed to emphasize multiple uses while applying some protective management (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics, there would be some long-term benefits to paleontological resources, but it would depend on the prescriptions for the individual units. See Section 4.2.9 Lands with Wilderness Characteristics for details. Where lands with wilderness characteristics units are managed to emphasize other multiple uses as a priority over protecting wilderness characteristics, ground-disturbing activities such as minerals development may still be allowed and would offer less protection to paleontological resources.

Impacts to paleontological resources vary among alternatives based on the acreage managed for wilderness characteristics as summarized in Table 4-99.

Table 4-99. Acres of Lands Managed for Wilderness Characteristics by Alternative

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	0	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	0	0	18,964	30,595	0
Emphasizes other multiple uses	0	0	0	30,862	65,446

4.2.9 Lands with Wilderness Characteristics

This section analyzes impacts to lands with wilderness characteristics from management actions of other resources and resource uses discussed in Chapter 2. Existing conditions concerning lands with wilderness characteristics are described in Section 3.2.10.

4.2.9.1 Analysis Methods

4.2.9.1.1 Indicators

For the purposes of this broad-scale analysis, the primary indicator of impacts to lands with wilderness characteristics is the number of acres of land where development or management actions would eliminate one or more values (roadless, naturalness, outstanding opportunities for solitude/primitive recreation) so that the area or a portion of the area no longer has wilderness characteristics. Ways in which development or management actions could adversely affect lands with wilderness characteristics include the following:

- Size
  - Are there potential roads or other human-made features that reduce the size of lands with wilderness characteristics parcel to fewer than 5,000 acres? Exceptions include if the parcel is adjacent to an existing land with wilderness characteristics, WSA, or wilderness unit or if the area is an island.
- Naturalness quality
  - Would human features be introduced into the environment?
  - Would disturbance of the natural ecosystem and key features of the area occur?
- Outstanding opportunities for solitude or primitive and unconfined recreation
  - Would any development or management actions reduce outstanding opportunities for solitude through introduction of human features, increased human activity, or noise?
  - Would any development or management actions reduce outstanding opportunities for primitive and unconfined recreation?

4.2.9.1.2 Methods and Assumptions

In the RMP and alternatives where some lands with wilderness characteristics would not be protected or where surface disturbance would occur, the wilderness characteristics of these areas may be at some risk of irreparable damage during the life of the plan, depending upon the specific resource use or other actions proposed by the RMP or alternative.

Adverse effects on the size, naturalness, and opportunities for solitude or primitive and unconfined recreation for identified lands with wilderness characteristics under all action alternatives primarily occur as a result of activities that cause surface disturbance. To assess effects on the wilderness character for each parcel, the analysis assumes that for any areas containing wilderness characteristics that are open to activities that cause surface disturbance, that surface disturbance would occur in that area sometime during the life of the plan. The analysis also assumes that the more surface disturbance that occurs within lands with wilderness characteristics parcel, the more the wilderness characteristics within a given lands with wilderness characteristics parcel are adversely affected under a particular alternative.

For mineral and renewable energy development, the more acres for which mineral and renewable energy development is open within lands with wilderness characteristics parcels, the fewer acres within those lands that retain wilderness character. In areas where mineral or renewable energy development would be allowed, the likelihood of surface disturbance affecting wilderness characteristics would be greater in areas where mineral or renewable leasing is open than in areas where leasing is open with moderate or major constraints. Areas that are closed to mineral or renewable leasing or withdrawn from leasing would have little or no adverse effect on the wilderness characteristics within lands with wilderness characteristics parcels.

Surface disturbance through mineral development, renewable energy development, utility corridors, and OHV use can affect the size of lands with wilderness characteristics parcel in multiple ways. One way is through the development of roads through an area. BLM criteria for lands with wilderness characteristics specifically exclude certain types of maintained roads to be included as part of an area considered for wilderness character. Mineral and renewable energy development in an area would require maintained roads to transport equipment, people, and structures to facilitate development. In addition, mineral development, renewable energy development, and OHV use would introduce human-made features into the environment, such as oil derricks, wind turbines, pipelines, and motorized vehicles.

Surface disturbance through mineral development, renewable energy development, utility corridors, and OHV use can affect the naturalness characteristic in several ways. One way in which surface disturbance can affect naturalness is through increased soil erosion, which can increase sedimentation in streams. Increased sedimentation in streams would modify riparian habitat for fish and wildlife and degrade karst resources. Surface disturbance can also modify vegetation types, which changes habitat for fish and wildlife, including sensitive, threatened, or endangered species. Vegetation modification can also reduce scenic quality. Finally, surface disturbance caused by introduction of oil and gas, renewable energy, or transmission line infrastructure would modify naturalness by introducing human objects into the natural environment. In some areas, grazing would require human structures such as watering tanks to facilitate grazing. The introduction of human structures to facilitate grazing on lands with wilderness characteristics would reduce the naturalness characteristic in those areas.

Surface disturbance through mineral development, renewable energy development, utility corridors, and OHV use would also affect opportunities for solitude or primitive and unconfined recreation. Opportunities for solitude can be affected by visual intrusion of human-made features or human-caused noise in the area. Noise from compressor stations, heavy equipment, or OHVs, as well as visual intrusions from solar panels, wind turbines, storage tanks, and transmission lines, would reduce opportunities for solitude on lands with wilderness characteristics.

In addition, the noise and presence of human structures and vehicles caused by mineral development, renewable energy development, utility corridors, and OHV use would conflict with primitive forms of recreation. The presence of human-caused noise and human structures reduces the size of areas in which hikers, hunters, and other primitive recreation users could recreate free from the hindrances caused by human development. The introduction of motorized vehicles to lands with wilderness characteristics would also increase the amount of non-primitive recreation occurring in the area.

With all action alternatives, lands with wilderness characteristics units would benefit from the special management attention they would receive as lands with wilderness characteristics, including exclusion from energy development and cross-country OHV use. Decisions that would generally have a positive impact on lands with wilderness characteristics include those involving soil, watershed, and vegetation (including riparian and upland vegetation) management using non-motorized methods. Protecting sensitive soils and watersheds and conducting vegetation treatments through non-motorized means would restore areas to resemble more natural ecosystems in the long term, which is important to protecting the naturalness of an area.

4.2.9.2 Direct and Indirect Impacts

4.2.9.2.1 Impacts of Actions on Lands with Wilderness Characteristics

Unit 801 (Adjacent to Lonesome Ridge WSA)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 801 (82 acres[1]) would be open with major constraints to leasable minerals on 81 acres and closed on 1 acre. Salable minerals would be closed in the entire area, and locatable minerals would be open on 41 acres and recommended for withdrawn on the remainder. Geothermal and solar energy development would be excluded from the area, and most of the area (81 acres) would be an avoidance area for wind energy development, with the remainder excluded. The No Action Alternative would maintain 41 acres as an avoidance area and 41 acres as open for ROWs. In all, 81 acres would be designated as OHV limited, and grazing would be open on the entire area. Half of the area (41 acres) would be managed as VRM Class I, and the remainder would be managed as VRM Class II. Because much of the area would be open for locatable mineral development, wind energy development and OHV travel, there would be increased potential for road development, surface

[1] GIS acreage calculations may vary from inventory by an acre or two due to GIS technology. The GIS generated numbers are used for consistency.

disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A through D

Under Alternatives through D, Unit 801 would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 801 (82 acres) would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal for the entire area. Geothermal, solar, and wind energy development would be excluded from the area. Under these alternatives, Unit 801 would be managed as excluded for ROWs. OHV travel would be closed on the entire area, and grazing would be open on the entire area. The area would be managed as VRM Class I except under Alternative B where 41 acres would be managed as VRM I and 41 acres would be managed as VRM II. Because much of the area would be closed for mineral development, renewable energy development and ROW development, and limited to existing trails for OHV travel, fire suppression, and geophysical exploration, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A through D would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Unit 803A (Lechuguilla South)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 803A (1,139 acres) would be closed to leasable and salable minerals on the entire area, and locatable minerals would be recommended for withdrawal for the area. Geothermal and solar energy development would be excluded from the area, and the area would be an avoidance area for wind energy development. The area would be maintained as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. The lands with wilderness characteristics parcel would be managed as VRM Class II. Because much of the area would be closed for mineral development, geothermal, and solar renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. There would be some increased potential for surface disturbance and visual intrusions from wind energy development, but as an avoidance area, the potential for development is low. Because the effects from development would be reduced under the No Action Alternative, the area would maintain the wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternatives A through D

Under Alternatives A through D, Unit 803A (1,139 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 803A would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal for the entire area. Under these alternatives, Unit 803A would be managed as an exclusion area for solar development on 1,130 acres, and the entire area would be managed as an exclusion area for wind energy development. Under these alternatives, Unit 803A would be managed as excluded for ROWs. The entire area would be OHV limited, and grazing would be open on1,130 acres. Under Alternative B, the area would be managed as VRM Class I, and for Alternatives A, C, and D, the area would be managed as VRM Class II. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A through D would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Unit 810 (Texas Hill North)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 810 (18,381 acres) would be open with standard terms and conditions to leasable minerals development on 5,303 acres. The remainder would be open with moderate constraints (11,355) or major constraints (1,724 acres) to leasable minerals development. Salable minerals development would be open with standard terms and conditions on 16,657 acres. The remainder (1,724 acres) would be closed to salable mineral development. Locatable minerals development would be open for the entire area. Solar energy development would be excluded from 14,509 acres (79%), and the remainder would be open (3,873 acres). Approximately 15,997 acres would be an avoidance area for wind energy development, and 2,399 acres would be open to wind energy development. The No Action Alternative would maintain 1,724 acres as an avoidance area and 16,657 acres as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Approximately 15,897 acres of the lands with wilderness characteristics parcel would be managed as VRM Class III and the rest (2,484 acres) managed as VRM Class IV. Because much of the area would be open for mineral development, and renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A and B

Under Alternatives A and B, Unit 810 (18,381 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 810 would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal for the entire area. Solar and wind energy development would be excluded from the area. Under these alternatives, Unit 810 would be managed as excluded for ROWs. The entire area would be OHV limited. Grazing would be open on 5,301 acres and the closed on the remainder. Under both alternatives, the area would be managed as VRM Class II. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative C

Under Alternative C, Unit 810 (18,381 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Under Alternative C, lands with wilderness characteristics within Unit 810 would be open with standard terms and conditions to leasable and salable minerals on 5,301 acres (29%). The remainder (13,078 acres) would be open with moderate constraints for leasable mineral development and salable mineral development. Under Alternative C, locatable minerals development would be open for the entire area. For renewable energy development, the BLM would manage 5,301 acres (29%) as open to wind energy development and variance for solar energy development under Alternative C. The remainder (13,078 acres) would be excluded from or closed to renewable energy development. The entire area would be OHV limited, and grazing would be open on the entire area. Under Alternative C, BLM would designate 5,301 acres as open for ROWs and the remainder (13,078 acres) would be managed as an avoidance area for ROWs. Approximately 15,970 acres of the lands with wilderness characteristics parcel would be managed as VRM Class III and the rest (2,410 acres) managed as VRM Class IV under Alternative C. Because portions of the area under Alternative C would be open for mineral development and renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Because Alternative C would apply management restrictions (conditions of use,

mitigation measures) to reduce impacts to wilderness characteristics, portions of the parcel would retain wilderness character, compared with the No Action Alternative. Those portions of the unit that are open for mineral and renewable energy development under Alternative C would not retain wilderness qualities. However, Alternative C would apply management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics.

Alternative D

Under Alternative D, Unit 810 (18,381 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Under Alternative D, leasable, salable, and locatable minerals development would be open with standard terms and conditions for the entire area. Under Alternative D, 13,080 acres of Unit 810 would be managed as an avoidance area for wind energy development. The remainder (5,301 acres) would be managed as open for wind. The entire area would be managed as a variance area for solar energy development under Alternative D. Under Alternative D, Unit 810 would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Approximately 15,970 acres of the lands with wilderness characteristics parcel would be managed as VRM Class III and the rest (2,410 acres) managed as VRM Class IV under Alternative D. Because portions of the area under Alternative D would be open for mineral development and renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Because Alternative D would emphasize other multiple uses as a priority over protecting wilderness characteristics, and mineral and renewable energy development offers little protection to wilderness character, those portions of the unit that are open for mineral and renewable energy development under Alternative D would not retain wilderness qualities if those areas are developed.

Unit 810A

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 810A (1,007 acres) would be open to leasable, salable, and locatable minerals on the entire area. Solar energy development would be excluded from 990 acres (98%), and the remainder would be variance (17 acres). The entire area would be an avoidance area for wind energy development. Wind energy development would be open on 190 acres (19%), and the remainder would be avoidance area (817 acres). The entire area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. The entire area would be managed as VRM Class III. Because much of the area would be open for mineral development, renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternatives A and B

Under Alternatives A and B, Unit 810A (1,007 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 810A would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal for the entire area. The entire area would be excluded from solar and wind energy development. Under these alternatives, Unit 810A would be managed as excluded for ROWs. The entire area would be OHV limited. Grazing would be open on the entire area under Alternative B and closed on the entire area under Alternative A. Under both alternatives, the area would be managed as VRM Class I. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative C

Under Alternative C, Unit 810A (1,007 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Lands with wilderness characteristics within Unit 810A would be managed as open with moderate constraints (CSU) for leasable mineral development and salable mineral development on the entire area, and open to locatable development on the entire area. The entire area would be excluded from solar development and wind energy development. Under Alternative C, Unit 810A would be managed as an avoidance area for ROWs. The entire area would be OHV limited, grazing would be managed as open. The entire area would be managed as VRM Class III. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under this alternative, compared with the No Action Alternative, Alternative C would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative D

Under Alternative D, Unit 810A (1,007 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Lands with wilderness characteristics within Unit 810A would be open to leasable, salable, and locatable mineral development on the entire area. For renewable energy development, the BLM would manage the entire area as excluded to solar development and avoidance area for wind energy development on 8,500 acres under Alternative D. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Under Alternative D, the lands with wilderness characteristics parcel would be managed as VRM Class III on the entire area. Because the area under Alternative D would be open for leasable and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Similar to the No Action Alternative, Alternative D offers little protection from wilderness character, and the parcel would not retain its wilderness qualities if developed.

Unit 810B (Texas Hill South)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Within Unit 810B (6,730 acres) leasable mineral development would be open with standard terms and conditions on 783 acres within, with the remainder (5,948 acres) open with moderate constraints. The entire area would be open with standard terms and conditions for salable mineral development. The entire area would also be open for locatable mineral development. Solar energy development would be excluded from 5,655 acres (84%), and the remainder would be variance (1,075 acres). The entire area would be an avoidance area for wind energy development. The entire area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Approximately 4,649 acres of the lands with wilderness characteristics parcel would be managed as VRM Class III and the rest (2,081 acres) managed as VRM Class IV. Because much of the area would be open for mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternatives A and B

Under Alternatives A and B, Unit 810B (6,730 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 810B would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal for the entire area. The entire area would be excluded from solar and wind energy development. Under these alternatives, Unit 810B would be managed as excluded for ROWs. The entire area would be OHV limited. Grazing would be open on 780 acres and closed on the remainder because of the Guadalupe Habitat Management Area. Under both alternatives, the area would be managed as VRM Class II. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternatives C and D

Under Alternatives C and D, Unit 810B (6,730 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Under Alternative C, lands with wilderness characteristics within Unit 810B would be open to leasable and salable minerals with standard terms and conditions on 780 acres (12%). The remainder (5,948 acres) would be open with moderate constraints for leasable mineral development and salable mineral development. Under Alternative C, locatable minerals development would be open for the entire area. Under Alternative D, leasable, salable, and locatable minerals development would be open with standard terms and conditions for the entire area. For renewable energy development, 780 acres (12%) would be managed as open to wind and solar energy development under Alternative C. The remainder (5,947 acres) would be excluded or closed to renewable energy development. Under Alternative D, renewable energy development would be open for wind energy development on 780 acres. The remainder (5,948 acres) would be managed as an exclusion area for wind energy development. Under Alternative D, all of Unit 810B would be managed as variance for solar energy development. Under Alternative C, BLM would designate 780 acres as open for ROWs and the remainder (5,948 acres) as an avoidance area for ROWs. Alternative D would designate the area as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. For both alternatives, approximately 5,832 acres of the lands with wilderness characteristics parcel would be managed as VRM Class III and the rest (897 acres) managed as VRM Class IV. Because portions of the area under both alternatives would be open for mineral development and renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Because Alternatives C and D would emphasize other multiple uses as a priority over protecting wilderness characteristics, those portions of the unit that are open for mineral and renewable energy development under Alternatives C and D would not retain wilderness qualities if those areas are developed.

Unit 813

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 813 (8,504 acres) would be open with standard terms and conditions to leasable and locatable minerals. Salable minerals would be open with moderate constraints. Geothermal, wind and solar energy development would be closed or excluded from the area. The area would be managed as open for ROWs and OHV limited. Fire suppression, geophysical exploration, and grazing would be open on the entire area. A total of 2,632 acres would be managed as VRM Class III, and the remainder (5,868 acres) would be managed as VRM Class IV. Because portions of the area would be open for mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A and B

Under Alternatives A and B, Unit 813 (8,504 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 813 would be closed to leasable mineral development, managed as open with moderate constraints for salable minerals, and recommended for withdrawal from locatable development. The area would be excluded from solar and wind energy development. Under these alternatives, Unit 813 would be managed as excluded for ROWs. The entire area would be OHV limited. Grazing would be closed under Alternative A (due to the Guadalupe Habitat Management Area) and open to grazing under Alternative B. Under both alternatives, the area would be managed as VRM Class I. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative C

Under Alternative C, Unit 813 (8,504 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Lands with wilderness characteristics within Unit 813 would be managed as open with major constraints (NSO) for leasable mineral development on 8,503 acres, managed as open with moderate constraints to salable minerals on 8,500 acres, and open to locatable development on 8,501 acres. The entire area would be excluded from solar development and avoided for wind energy development on 8,500 acres. Under Alternative C, Unit 813 would be managed as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. The area would be managed as VRM Class III on 8,501 acres. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under this alternative, compared with the No Action Alternative, Alternative C would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative D

Under Alternative D, Unit 813 (8,504 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Lands with wilderness characteristics within Unit 813 would be open to leasable, salable, and locatable mineral development on 8,501 acres. For renewable energy development, the BLM would manage the entire area as excluded to solar development and avoidance area for wind energy development on 8,500 acres under Alternative D. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. For Alternative D, the lands with wilderness characteristics parcel would be managed as VRM Class III (2,632 acres) and VRM IV (5,869 acres). Because portions of the area under Alternative D would be open for leasable and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Similar to the No Action Alternative, Alternative D offers little protection from wilderness character, and the parcel would not retain its wilderness qualities if developed.

Unit 815 (Slaughter and Double Canyons)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 815 (3,989 acres) would be open with standard terms and conditions to leasable and salable minerals on 1,033 acres (26%). Leasable minerals would be open with major constraints, and salable minerals would be closed on the remainder (2,957 acres). Locatable minerals would be open on the entire area. Geothermal and solar energy development would be closed or excluded from the area, and the area would be an avoidance area for wind energy development. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. A total of 2,956 acres would be managed as VRM Class II, and the remainder would be managed as VRM Class III. Because portions of the area would be open for mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A through C

Under Alternatives A through C, Unit 815 (3,989 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 815 would be closed to leasable mineral development under Alternatives A and B. Under Alternative C, leasable mineral development would be open with major constraints for all of Unit 815. Unit 815 would be closed to salable minerals and locatable minerals would be recommended for withdrawal for the entire area under Alternatives A through C. Locatable minerals would be recommended for withdrawal for the entire area under Alternatives A through C. Solar and wind energy development would be excluded from or closed within the area. Under these alternatives, Unit 815 would be managed as excluded for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Under Alternatives A through C, all of the area would be managed as VRM Class II. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A through C would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative D

Under Alternative D, Unit 815 (3,989 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Lands with wilderness characteristics within Unit 815 would be open to leasable minerals with major constraints, closed to salable mineral development, and open for locatable mineral development. For renewable energy development, the BLM would manage the area as excluded for solar development and avoidance for wind energy development under Alternative D. The area would be managed as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. For Alternative D, the lands with wilderness characteristics parcel would be managed as VRM Class III. Because portions of the area under Alternative D would be open for leasable and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Similar to the No Action Alternative, Alternative D offers little protection from wilderness character, and the parcel would not retain its wilderness qualities if developed. However, Alternative D would apply management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics.

Unit 902 (Big Ox Yoke)

No Action Alternative

Under the No Action Alternative, no lands within the CFO planning area would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 902 (9,834 acres) would be open to leasable, salable, and locatable minerals on the entire area. Solar energy development would be excluded from 9,824 acres (99%), and the remainder would be managed as variance (9 acres). Approximately 9,456 acres would be an avoidance area, and 377 acres would be open for wind energy development. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. The area would also be managed as VRM Class VI. Because much of the area would be open for mineral development, ROWs, and portions of the area would be open for renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A and B

Under Alternative A and B, Unit 902 (9,834 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 902 would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal for the entire area under Alternative A. Leasable minerals would be closed, salable minerals would be open with moderate constraints, and locatable minerals would be open for the entire area under Alternative B. Solar and wind energy development would be excluded from the area. Under these alternatives, Unit 902 would be managed as excluded for ROWs. The entire area would be OHV limited. Grazing would be closed on all but two acres under Alternative A and the entire area would be open under Alternative B. Under both alternatives, the entire area would be managed as VRM Class I. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative C

Under Alternative C, Unit 902 (9,834 acres) would not be managed toto emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. For this alternative, Lands with wilderness characteristics within Unit 902 would be open with moderate constraints for leasable mineral development, open with special terms and conditions for salable mineral development, and open for locatable mineral development. For renewable energy development, the BLM would designate the area as an exclusion area for solar and an avoidance area for wind energy development under Alternative C. The area would be managed as an exclusion area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. For Alternative C, the lands with wilderness characteristics parcel would be managed as VRM Class III. Compared with the No Action Alternative, Alternative C would have reduced adverse effects on wilderness character. Because portions of the area under Alternative C would be open for leasable, salable, and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed. However, Alternative C would apply management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics.

Alternative D

Under Alternative D, Unit 902 (9,834 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Lands with wilderness characteristics within Unit 902 would be open with standard terms and conditions to leasable mineral development, salable mineral development, and locatable mineral development. For renewable energy development, the BLM would manage the area as an exclusion area for solar development and an avoidance area for wind development. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. For Alternative D, the lands with wilderness characteristics parcel would be managed for VRM Class III. Because all of the area under Alternative D would be open for leasable, salable, and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Similar to the No Action Alternative, Alternative D offers little protection for wilderness character, and the parcel would not retain its wilderness qualities if developed. However, Alternative D would apply management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics.

Unit 909 (Salt House Draw)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 909 (9,130 acres) would be open to leasable, salable, and locatable minerals on the entire area. Solar energy development would be excluded, respectively, from 6,697 acres (73%), and the remainder would be managed as variance (2,433 acres). Approximately 184 acres would be an avoidance area, and 8,946 acres would be open for wind energy development. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. The area would also be managed as VRM Class IV. Because much of the area would be open for mineral development, and portions of the area open for renewable energy development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A and B

Under Alternatives A and B, Unit 909 (9,130 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 909 would be closed to leasable mineral development under Alternatives A and B. Salable minerals would be closed for the entire area under Alternative A. Under Alternative B, the entire area would be open with moderate constraints for salable mineral development. Under Alternative A, the entire area would be recommended for withdrawal from locatable mineral development. Under Alternative B, the entire area would be open for locatable mineral development.

Under Alternatives A and B, Unit 909 would be excluded from wind and solar development. Under these alternatives, Unit 909 would be managed as excluded for ROWs. The entire area would be OHV limited. Grazing would be open on all but 10 acres under Alternative A, and the entire area would be open under Alternative B. Under Alternative A, the entire area would be managed as VRM Class II. The entire area would be managed as VRM Class I under Alternative B. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative C

Under Alternative C, Unit 909 (9,130 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. For this alternative, Lands with wilderness characteristics within Unit 909 would be open with moderate constraints for leasable mineral development and open with special terms and conditions for salable mineral development. Alternative C would also be open for locatable mineral development. For renewable energy development, the BLM would manage the area as an exclusion area for solar and wind energy development. The area would be managed as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Under Alternative C, Unit 909 would be managed as VRM Class III. Because portions of the area under Alternative C would be open for leasable, salable, and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternative D

Under Alternative D, Unit 909 (9,130 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Lands with wilderness characteristics within Unit 909 would be open with standard terms and conditions for leasable, salable, and locatable mineral development. For renewable energy development, the BLM would designate the area as an exclusion area for solar energy development and an avoidance area for wind energy development under Alternative D. The area would be managed as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. For Alternative D, 792 acres of the lands with wilderness characteristics parcel would be managed as VRM Class III and 8,337 acres managed as VRM Class IV. Because all of the area under Alternative D would be open for leasable, salable, and locatable mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Similar to the No Action Alternative, Alternative D offers little protection from wilderness character, and the parcel would not retain its wilderness qualities if developed.

Unit 922 (Thurman Draw)

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 922 (5,750 acres) would be open with standard terms and conditions to leasable and salable minerals on 1,386 acres (24%). Leasable minerals would be open with major constraints, and salable minerals would be closed on the remainder (4,364 acres). Locatable minerals would be open on the entire area. Geothermal and solar energy development would be closed and excluded from the area, and the area would be an avoidance area for wind energy development. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Approximately 4,364 acres would be managed as VRM Class II, and the remainder would be managed as VRM Class III. Because portions of the area would be open for mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A and B

Under Alternatives A and B, Unit 922 (5,750 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 922 would be closed to leasable and salable minerals, and locatable minerals would be recommended for withdrawal. Solar and wind energy development would be excluded from the area. Under these alternatives, Unit 922 would be managed as an exclusion area for ROWs. The entire area would be OHV limited, and grazing

would be open. Under both alternatives, the area would be managed as VRM Class II. Because the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternatives C and D

Under Alternatives C and D, Unit 922 (5,750 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Under Alternative C, lands with wilderness characteristics within Unit 922 would be open with moderate constraints to leasable and open with special terms and conditions to salable minerals on 1,385 acres (24%). The remainder (4,365 acres) would be open with major constraints for leasable mineral development and closed to salable mineral development. The entire area would be open for locatable mineral development under Alternative C. Under Alternative D, leasable minerals development would be open with moderate constraints on 1,385 acres (24%). The remainder of the area would be open with major constraints to leasable minerals (4,365 acres). Unit 922 would be open to salable minerals development with special terms and conditions on 1,370 acres (24%). The remainder of the area would be closed to salable minerals development (4,366 acres) or open with standard terms and conditions (15 acres). The entire area would be open for locatable mineral development under Alternative D.

For renewable energy development, the BLM would be an avoidance area on 1,385 acres (12%) for wind energy development under Alternative C. The remainder (4,366 acres) would be excluded from wind energy development. Unit 922 would be excluded from solar energy development under Alternative C. Under Alternative D, all of Unit 922 would be an avoidance area for wind energy development and excluded from solar energy development. Under Alternative C, the BLM would manage 1,385 acres as an avoidance area for ROWs and the remainder (4,366 acres) as an exclusion area for ROWs. Alternative D would manage all of the area as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area under Alternatives C and D. Under Alternative C, approximately 4,364 acres of the lands with wilderness characteristics parcel would be managed as VRM Class II and the rest (1,386 acres) managed as VRM Class III. Alternative D would designate the entire area as VRM Class III.

Similar to the No Action Alternative, because much of the area under both alternatives would be open for mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed. However, both alternatives would apply management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics.

Unit 125

No Action Alternative

Under the No Action Alternative, no lands within the CFO would be managed to maintain wilderness characteristics. Lands with wilderness characteristics within Unit 125 (2,120 acres) would be open with standard terms and conditions to leasable, salable, and locatable mineral development. The entire area would be avoidance area for wind energy development, and would be excluded from solar energy development. The area would be managed as open for ROWs and OHV limited. Fire suppression, geophysical exploration, and grazing would be open on the entire area. The entire area would be managed as VRM Class IV. Because the area would be open for mineral development, fire suppression, and geophysical exploration, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Therefore, the parcel would not retain its wilderness qualities if developed.

Alternatives A and B

Under Alternatives A and B, Unit 125 (2,120 acres) would be managed to protect its wilderness characteristics as a priority over multiple uses. Lands with wilderness characteristics within Unit 125 would be closed to leasable and salable mineral development, and recommended for withdrawal from locatable development. The entire area would be excluded from wind energy development, and variance for solar energy development. Under these alternatives, Unit 125 would be managed as excluded for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Under both alternatives, the area would be managed as VRM Class I. Because the area would be closed for mineral development, wind energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under these alternatives, compared with the No Action Alternative, Alternatives A and B would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative C

Under Alternative C, Unit 125 (2,120 acres) would be managed to emphasize other multiple uses while applying management restrictions (conditions of use, mitigation measures) to reduce impacts to wilderness characteristics. Lands with wilderness characteristics within Unit 125 would be managed as open with moderate constraints (CSU) for leasable and salable mineral development on the entire area, and open to locatable development on the entire area. The entire area would be excluded from wind energy development and variance for solar energy development on the entire area. Under Alternative C, Unit 125 would be managed as an avoidance area for ROWs. The entire area would be OHV limited, and grazing would be managed as open. The area would be managed as VRM Class III on 8,501 acres. Because much of the area would be closed for mineral development, renewable energy development, and ROW development, and OHV limited, there would be reduced potential for road development, surface disturbance, visual intrusions, and noise intrusions. Because these effects would be reduced under this alternative, compared with the No Action Alternative, Alternative C would maintain the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation.

Alternative D

Under Alternative D, Unit 125 (2,120 acres) would be managed to emphasize other multiple uses as a priority over protecting wilderness characteristics. Lands with wilderness characteristics within Unit 125 would be open to leasable, salable, and locatable mineral development on the entire area. For renewable energy development, the BLM would manage the entire area as variance for solar development and open for wind energy development on the entire area. The area would be managed as open for ROWs. The entire area would be OHV limited, and grazing would be open on the entire area. Under Alternative D, the lands with wilderness characteristics parcel would be managed as VRM Class III on the entire area. Because the entire area under Alternative D would be open for mineral development, there would be increased potential for road development, surface disturbance, visual intrusions, and noise intrusions. As discussed in the Methods and Assumptions section above, these effects would reduce the area's wilderness qualities of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. Similar to the No Action Alternative, Alternative D offers little protection from wilderness character, and the parcel would not retain its wilderness qualities if developed.

4.2.10 Visual Resources

4.2.10.1 Indicators

The BLM's VRM class objectives (see Section 3.2.11 and below) and the CFO planning area acres within each of the VRM classes are the indicators used in analyzing surface disturbance, visual intrusions, or air quality (i.e., visibility) impacts on visual resources. These objectives provide a systematic and consistent basis for determining how much current management actions or a proposed action would affect scenic quality, as well as determining the level of disturbance an area could support while still meeting that area's VRM objectives.

As discussed in Section 3.2.11, a visual resource inventory (VRI) was conducted to assess current scenic conditions throughout the planning area, and acreages were determined for each inventory class (VRI Class I–IV). The BLM VRI classes assign value and serve as the principal consideration when making management decisions that affect the visual environment during land use planning. In general, VRI Class I is assigned to special areas where previous management decisions have been made to maintain a natural landscape. Examples of these areas are designated wilderness areas and segments along a designated WSR. VRI Class II, III, and IV are usually assigned based on a combination of scenic quality, visual sensitivity, and viewing distances. Visual sensitivity is the concern that the public has for maintaining an area's scenic quality; viewing distance is the distance that an area can be seen from commonly used public viewpoints such as highways and secondary travel routes, trails, byways, points of interest, and campgrounds. The resulting current visual inventory is the baseline for visual values in the planning area and it assisted the CFO in considering visual values during the RMP process. The results of the VRI for the planning area are shown below in Table 4-100.

The VRI classes do not provide management direction and are not used to limit or constrain surface-disturbing activities within the planning area. As mentioned above, these VRI acreages were used during the RMP process along with other resource management considerations (balancing the needs of other resources and planning area activities) to create a range of proposed VRM class acreages for each alternative. As such, the proposed VRM classes for each action alternative are the result of a synthesis or balance of other proposed resource and land management actions, including balancing the needs for minerals exploration and development, the need for providing recreational opportunities for a variety of activities, the need to establish special designations areas to preserve wildlife and vegetation habitat, and the need to permit land use authorizations for utility power lines with the visual inventory classifications of scenic quality, visual resource values, and viewer sensitivity within the Carlsbad planning area.

The BLM's VRM classes provide direct management through the designation of objectives that establish the desired outcomes and future landscape conditions when implementing the land use plan. Once the proposed VRM classes are designated when the revised RMP is approved, then the visual objectives that define each of the VRM classes can be used to limit, constrain, or permit resource activities to meet those objectives. The four VRM classes and their objectives used within the VRM system to describe the different degrees of project-related impacts allowed to the existing landscape are:

- **Class I.** The objective is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and should not attract attention.
- **Class II.** The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class III.** This class objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
- **Class IV.** The objective of Class IV is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic elements of the landscape (BLM 1986).

Table 4-100. VRI Class Acreages (BLM-administered lands only)

VRI Class I	VRI Class II	VRI Class III	VRI Class IV	Total Acreage
7,001	66,414	185,878	2,524,131	2,783,424

4.2.10.1.1 Methods and Assumptions

Methods

The impacts analysis method compared the current VRI acreages with the existing and proposed VRM acreages for all of the alternatives and an analysis that compared the VRM class acreages designated for the BLM-administered portion of the planning area (the current 1988 RMP VRM Class I–IV) with the acres of proposed VRM classes determined during the revised RMP process for each alternative. The action alternatives VRM class acreages are the areas that are proposed for VRM class designation and management when the RMP process has been completed and the revised Carlsbad RMP has been approved.

Once the RMP is completed and the VRM classes are approved and designated, the VRM class objectives for an area are applicable to all of the land management actions within that area. All resource management and planning actions that could impact visual quality (for example, well drilling, utility power line construction, or hard rock mining) are required to consider and comply with the VRM class objectives of the area within which that activity takes place. This means that the level or degree of all potential impacts on visual resources that would be produced by the proposed RMP management actions would be required to conform to the approved VRM class objectives. It also means that while these activities would have to conform to the VRM objectives, there would still be potential long-term impacts to the landscape that could change the value ratings within the visual resource inventory factors (see the Impacts of Other Resource Actions on Visual Resources subsection at the end of this section).

Assumptions

The analysis of impacts to visual resources when comparing current VRM class acreages (No Action) to the proposed VRM class (Alternatives A–D) acres is based on the following:

- Increased acreages of proposed VRM Class I and II would be more protective of visual resources within the planning area because these VRM classes allow less visual contrast and visual disturbance. These VRM classes, therefore, would preserve existing scenic quality once these classes are designated when the revised RMP is approved.
- Increased acreages of proposed VRM Class III and IV would be less protective of visual resources within the planning area because they would allow more surface disturbances and changes to existing scenic quality when these classes are designated.
- Designated VRM class objectives, once established at the approval of the revised Carlsbad RMP, would supersede other resource activities. In other words, potential impacts caused by activities that are proposed within an area with a designated VRM class must conform to and not exceed the visual resource objectives permitted under that VRM class.

4.2.10.2 Direct and Indirect Impacts

4.2.10.2.1 Impacts of Visual Resources Actions

Impacts from Management Common to All

The impacts common to all of the alternatives would designate VRM classes and class objectives for all of the BLM-administered public lands within the planning area. The designations for the No Action and the action alternatives are shown in Table 4-101. As discussed above, VRM Class I and II objectives would permit very low to minor surface disturbances and changes to visual resources; VRM Class III and IV objectives would permit moderate to major surface disturbances and alterations of visual resources. Note that the use of low, minor, moderate, and major in this context are not subjective terms. These are terms contained within the BLM's VRM class objective descriptions and are used to define those objectives' limitations on project-related scenic quality and landscape contrast changes.

Table 4-101. Visual Resource Management Acreages under BLM Administration, by Alternative

VRM Class	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205
Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Subtotal I and II	50,671 (1.8)	273,710 (9.8)	357,802 (12.8)	67,962 (2.4)	48,263 (1.7)
Subtotal III and IV	2,733,187 (98.2)	2,509,805 (90.2)	2,425,678 (87.2)	2,715,595 (97.6)	2,735,321 (98.3)
Total*	***2,783,858***	***2,783,514***	***2,783,481***	***2,783,558***	***2,783,585***

Note: The number in parentheses is the percentage of total acreage.
*Totals differences are due to slight differences in GIS mapping shapefiles.

Impacts from the No Action Alternative

Visual Resource Inventory Analysis

Using GIS, the VRI Class I through IV within the planning area were compared to the current designated VRM classes under the No Action Alternative and to the proposed VRM classes under the action alternatives. Table 4-102 below shows the VRM classes by the VRI classes. The numbers in the table cells represent the acres of VRM within each VRI class. For example, of the 7,002 acres inventoried and determined to be at the highest level of visual values and scenic quality under VRI Class I, 6,984 acres are within the VRM Class I areas for the highest level of scenic quality protection, and 8 acres of VRI Class I are within VRM Class II areas for high scenic protection. The numbers in parentheses under the action alternatives (A–D) represent the acreage changes (increased or decreased) when compared to the No Action Alternative; the numbers within brackets represent the percent of acreage change compared to the No Action Alternative.

Table 4-102. VRM Classes by VRI Class in the No Action Alternative

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV
VRM Class I	6,984	35	8	28
VRM Class II	8	12,297	9,108	22,186
VRM Class III	10	54,074	65,932	282,655
VRM Class IV	0	9	110,830	2,219,262
Totals	***7,002***	***66,414***	***185,878***	***2,524,131***

Under the No Action Alternative 6,992 acres of designated VRM Class I and II lie within areas inventoried as having very high scenic quality and visual values under VRI Class I (99.9% of the total VRI Class I area). Under VRI Class II (areas determined to have high scenic quality and visual values), 12,332 acres of designated VRM Class I and II lie within the VRI boundaries, which is 19% of the total VRI Class II area.

The following three tables for scenic quality, sensitivity rating, and distance zones show the VRM class acreages within the VRI scenic quality ratings areas, sensitivity ratings areas, and distance zone areas under the No Action Alternative. These acreages lie within the BLM-administered portions of the CFO.

Table 4-103. VRM Classes by VRI Scenic Quality Ratings in the No Action Alternative

VRM Class	Scenic Quality Ratings		
	A*	B	C
VRM Class I	2,864	4,162	0
VRM Class II	4,722	25,764	10,664
VRM Class III	26,203	174,479	199,341
VRM Class IV	9	247,340	2,072,661
Total	***33,798***	***451,745***	***2,282,666***

*[1]The "A" scenic quality rating encompasses lands with high scenic quality; "B" ratings include lands with moderate scenic quality; "C" ratings are lands with low scenic quality.

Table 4-104. VRM Classes by VRI Sensitivity Ratings in the No Action Alternative

VRM Class	VRI Sensitivity Rating		
	Low	Medium	High
VRM Class I	7,058	0	0
VRM Class II	19,199	24,336	29
VRM Class III	61,279	315,485	24,294
VRM Class IV	415	824,476	1,503,413
Total	***87,951***	***1,164,296***	***1,527,736***

Table 4-105. VRM Classes by VRI Distance Zones in the No Action Alternative

VRM Class	VRI Distance Zones		
	Foreground-Middleground	Background	Seldom Seen
VRM Class I	3,572	261	3,222
VRM Class II	19,208	4,648	19,744
VRM Class III	167,496	34,897	200,277
VRM Class IV	614,785	348,320	1,270,982
Total	***805,061***	***388,126***	***1,494,225***

Visual Resource Management Analysis

Under the current RMP (see Table 4-101), 7,058 acres (0.25% of BLM-administered lands within the planning area) would be managed for the highest level of visual resources protection under VRM Class I objectives, and 43,613 acres (1.57% of BLM-administered lands) would be managed at a high level of protection under VRM Class II. The remainder of the BLM-administered lands in the planning area (2,733,187 acres or 98.18%) would be managed under lower levels of visual resource protection through VRM Class III and IV objectives. The area managed under VRM Class I is the Lonesome Ridge ACEC; VRM Class II areas include the Pecos River corridor SRMA, cave management units, numerous ACECs, and dispersed acreages within the planning area. The impacts to visual resources would be beneficial in the long term for those areas that are managed for resource protection under VRM Class I and II, while there would be long-term, adverse impacts to scenic quality in those areas that would continue to be managed under VRM Class III and IV.

Impacts from Alternative A

Visual Resource Inventory Analysis

Table 4-106 shows the acres and percent change of proposed Alternative A VRM classes within the VRI classes. The numbers in parentheses show the changes of acreage, either increased or decreased, when compared to the No Action Alternative acreages; the numbers in brackets show the acreage percent increase or decrease compared to the No Action Alternative.

Table 4-106. VRM Classes by VRI Class for Alternative A

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV
VRM Class I	6,985 (+1) [0%]	126 (+91) [261%]	2,368 (+2,360) [30274%]	28,271 (+28,243) [0%]
VRM Class II	3 (-5) [-62%]	26,232 (+13,935) [113%]	40,481 (+31,373) [344%]	169,186 (+147,000) [663%]
VRM Class III	14 (+4) [46%]	40,055 (-14,019) [-26%]	50,182 (-15,750) [-24%]	276,919 (-5,736) [-2%]
VRM Class IV	(+) [0%]	(-9) [-100%]	92,822 (-18,008) [-16%]	2,049,466 (-169,796) [-8%]
Total	***7,002*** ***(+1) [0%]***	***66,413*** ***(-1) [0%]***	***185,853*** ***(-25) [0%]***	***2,523,842*** ***(-289) [0%]***

When compared with the No Action Alternative, management actions under Alternative A would not change the areas considered for designation as VRM Class I and II within VRI Class I, and increase the areas considered for VRM Class I and II designation by 14,026 acres within VRI Class II. These increases would be beneficial for visual resources in the long term because very high scenic quality would be maintained and there would be an increase in scenic quality preservation or maintenance within known high-quality, sensitive scenic landscapes.

The following three tables for scenic quality, sensitivity rating, and distance zones show the proposed VRM class acreages within the VRI scenic quality ratings areas, sensitivity ratings areas, and distance zone areas for Alternative A (Table 4-107 through Table 4-109). These acreages lie within the BLM-administered portions of the planning area. As mentioned for the above Table 4-98, the numbers in parentheses show the changes of acreage, either increased or decreased, when compared to the No Action Alternative acreages. The numbers in brackets show the acreage percent increase or decrease compared to the No Action Alternative. These symbols are also used for the tables that follow for Alternatives B, C, and D.

Table 4-107. VRM Classes by VRI Scenic Quality Ratings in Alternative A

VRM Class	Scenic Quality Ratings		
	A	B	C
VRM Class I	2,898 (+33) [1%]	14,209 (+81) [2%]	20,611 (+20,611) [0%]
VRM Class II	15,804 (+10,486) [296%]	123,040 (+95,041) [374%]	93,718 (+83,054) [779%]
VRM Class III	15,096 (+-10,516) [-43%]	111,886 (+-63,536) [-44%]	239,137 (+39,796) [20%]
VRM Class IV	0	202,575 (+-31,546) [-17%]	1,929,052 (+-143,609) [-7%]
Total	***33,798*** ***(+) [0%]***	***451,710*** ***(+-35) [0%]***	***2,282,518*** ***(+-148) [0%]***

Table 4-108. VRM Classes by VRI Sensitivity Ratings in Alternative A

VRM Class	VRI Sensitivity Rating		
	Low	Medium	High
VRM Class I	7,171 (+113) [0%]	30,571 (+30,571) [0%]	0
VRM Class II	29,236 (+10,037) [52%]	203,508 (+179,172) [736%]	1,677 (+1,648) [5723%]
VRM Class III	51,538 (-9,741) [-16%]	227,983 (-87,502) [-28%]	87,545 (+63,251) [260%]
VRM Class IV	0	702,196 (-122,280) [-15%]	1,438,393 (-65,020) [-4%]
Total	***87,945*** ***(-6) [0%]***	***1,164,258*** ***(-38) [0%]***	***1,527,615*** ***(-121) [0%]***

Table 4-109. VRM Classes by VRI Distance Zones in Alternative A

VRM Class	VRI Distance Zones		
	Foreground-Middleground	Background	Seldom Seen
VRM Class I	10,990 (+7,418) [208%]	1,000 (+739) [283%]	25,759 (+22,537) [699%]
VRM Class II	113,329 (+94,121) [490%]	23,635 (+18,987) [409%]	98,946 (+79,202) [401%]
VRM Class III	145,866 (-21,630) [-13%]	34,959 (+62) [0%]	186,345 (-13,932) [-7%]
VRM Class IV	543,956 (-70,829) [-12%]	329,889 (-18,431) [-5%]	1,172,375 (-98,607) [-8%]
Total	***814,141*** ***(+9,080) [1%]***	***389,483*** ***(+1,357) [0%]***	***1,483,425*** ***(-10,800) [-1%]***

Visual Resource Management Analysis

Under Alternative A, 37,764 acres (1.36% of BLM-administered lands) would be designated under VRM Class I objectives to maintain very high-quality scenic landscapes (see Table 4-101 above). Preservation of scenic quality at high levels under VRM Class II objectives would be applied to 235,946 acres (8.48% of the BLM-administered lands in the planning area). Management of visual landscapes at lower levels of scenic quality that would permit moderate to major changes to the landscape under VRM Class III and IV designations would be applied to the remaining 2,509,805 acres of the planning area (90.17%).

Compared to the No Action Alternative, VRM class designations under Alternative A would increase 30,706 acres of VRM Class I protection and increase 192,333 acres managed under VRM Class II protection. This would be beneficial to visual resources because there would be more direct, long-term preservation-related impacts to the resource and visual values than under the No Action Alternative; a total of 273,710 acres would be protected under the high and highest VRM management objectives compared to 50,671 acres under the No Action Alternative. This is an increase in the acreage of BLM-administered lands in the planning area managed under VRM Class I and II by 8.0%, with a corresponding reduction in acres managed under VRM Class III and IV. Areas where there would be a long-term, beneficial increase in VRM Class I protection would be within the Devil's Den, Lonesome Ridge, McKittrick Canyon, and Mudgett's WSAs. Areas beneficially managed under VRM Class II protection would include numerous proposed ACECs and the Delaware and Black Rivers segments recommended for inclusion in the NWSRS. Under this alternative, management actions would require hooded or downward-facing lighting for all lighted production facilities that would be beneficial in the long term to scenic quality and visual resources to lower light pollution by reducing skyglow (skyglow is the light that radiates upward into the sky at night from artificial light sources). Reduced skyglow would beneficially improve night sky viewing.

Impacts from Alternative B

Visual Resource Inventory Analysis

Table 4-110 shows the acres of proposed Alternative B VRM classes within the VRI classes. The numbers in parentheses show the changes of acreage, either increased or decreased, when compared to the No Action Alternative acreages.

Table 4-110. VRM Classes by VRI Class for Alternative B

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV
VRM Class I	6,986 (+2) [0%]	4,474 (+4,439) [12722%]	2,351 (+2,343) [30056%]	28,278 (+28,250) [0%]
VRM Class II	5 (-3) [-37%]	47,297 (+35,000) [285%]	65,842 (+56,734) [623%]	202,505 (+180,319) [813%]
VRM Class III	11 (+1) [15%]	14,644 (-39,430) [-73%]	27,458 (-38,474) [-58%]	252,037 (-30,618) [-11%]
VRM Class IV	(+) [0%]	(-9) [-100%]	90,201 (-20,629) [-19%]	2,040,988 (-178,274) [-8%]
Total	***7,002*** ***(+1) [0%]***	***66,415*** ***(+1) [0%]***	***185,852*** ***(-26) [0%]***	***2,523,808*** ***(-323) [0%]***

When compared with the No Action Alternative, management actions under Alternative B would not change the areas considered for designation as VRM Class I and II within VRI Class I, and increase the areas considered for VRM Class I and II designation by 39,439 acres within VRI Class II. These increases would be beneficial for visual resources in the long term because very high scenic quality would be maintained and there would be an increase in scenic quality and visual values preservation or maintenance within known high-quality, sensitive scenic landscapes.

The following three tables for scenic quality, sensitivity rating, and distance zones show the proposed VRM class acreages within the VRI scenic quality ratings areas, sensitivity ratings areas, and distance zone areas for Alternative B (Table 4-111 through Table 4-113). Acreage changes and percentages of acreage change (parentheses and brackets), either increased or decreased, are the comparisons to the No Action Alternative.

Table 4-111. VRM Classes by VRI Scenic Quality Ratings in Alternative B

VRM Class	Scenic Quality Ratings		
	A	B	C
VRM Class I	2,898 (+34) [1%]	4,242 (+80) [2%]	(+) [0%]
VRM Class II	6,738 (+2,016) [43%]	34,233 (+8,469) [33%]	17,994 (+7,330) [69%]
VRM Class III	24,162 (+-2,041) [-8%]	207,136 (+32,657) [19%]	315,375 (+116,034) [58%]
VRM Class IV	1 (+-8) [-89%]	206,084 (+-41,256) [-17%]	1,949,206 (+-123,455) [-6%]
Total	***33,799*** ***(+1) [0%]***	***451,695*** ***(+-50) [0%]***	***2,282,575*** ***(+-91) [0%]***

Table 4-112. VRM Classes by VRI Sensitivity Ratings in Alternative B

VRM Class	VRI Sensitivity Rating		
	Low	Medium	High
VRM Class I	11,512 (+4,454) [63%]	30,570 (+30,570) [0%]	0
VRM Class II	62,644 (+43,445) [226%]	226,672 (+202,336) [831%]	24,821 (+24,792) [86092%]
VRM Class III	13,793 (-47,486) [-77%]	210,258 (-105,227) [-33%]	70,025 (+45,731) [188%]
VRM Class IV	0	696,798 (-127,678) [-15%]	1,432,693 (-70,720) [-5%]
Total	***87,949*** ***(-2) [0%]***	***1,164,298*** ***(+2) [0%]***	***1,527,539*** ***(-197) [0%]***

Table 4-113. VRM Classes by VRI Distance Zones in Alternative B

VRM Class	VRI Distance Zones		
	Foreground-Middleground	Background	Seldom Seen
VRM Class I	11,310 (+7,738) [217%]	1,312 (+1,051) [402%]	29,465 (+26,243) [814%]
VRM Class II	170,378 (+151,170) [787%]	26,973 (+22,325) [480%]	118,306 (+98,562) [499%]
VRM Class III	94,951 (-72,545) [-43%]	33,195 (-1,702) [-5%]	166,004 (-34,273) [-17%]
VRM Class IV	537,460 (-77,325) [-13%]	328,004 (-20,316) [-6%]	1,169,658 (-101,324) [-8%]
Total	***814,099*** ***(+9,038) [1%]***	***389,484*** ***(+1,358) [0%]***	***1,483,433*** ***(-10,792) [-1%]***

Visual Resource Management Analysis

Under Alternative B, 42,102 acres (see Table 4-101) would be managed under VRM Class I objectives (1.51% of BLM-administered lands in the planning area) for very high-quality landscape preservation. Approximately 315,700 acres would be designated under VRM Class II objectives (11.34% of the BLM planning area) for preservation of high-quality landscapes. The remaining 87.2% of the planning area (2,425,678 acres) would be managed under VRM Class III and IV objectives that would permit moderate to major landscape changes.

Compared to current VRM class designations (under the No Action Alternative), management actions under this alternative would designate 35,044 more acres under VRM Class I and 272,087 more acres under VRM Class II. This would have more beneficial, direct, long-term impacts on visual resources and visual values because 11% more of the planning area would be managed to preserve scenic quality under VRM Class I and II objectives than under the No Action Alternative. Areas that would be beneficially impacted in the long term under VRM Class I objectives would be the same as discussed under Alternative A with additional visual resource protection given to the Lonesome Ridge and the Serpentine Bends ACECs. Beneficial visual quality protection under VRM Class II objectives would be given to the La Cueva SRMA, numerous proposed ACECs, a 1-mile-wide visual buffer on either side of Dark Canyon Road, and the Black and Delaware River corridors. Under this alternative, management actions would require that all permanent lighting in the Guadalupe Escarpment area be hooded or downward facing to reduce light pollution (skyglow). This would have long-term beneficial impacts on night sky viewing within the area and surrounding areas.

Impacts from Alternative C

Visual Resource Inventory Analysis

Table 4-114 shows the acres of proposed Alternative C VRM classes within the VRI classes. The numbers in parentheses show the changes of acreage, either increased or decreased, when compared to the No Action Alternative acreages.

Table 4-114. VRM Classes by VRI Class for Alternative C

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV
VRM Class I	6,985 (+1) [0%]	126 (+91) [261%]	30 (+22) [285%]	28 (+) [0%]
VRM Class II	3 (-5) [-62%]	15,893 (+3,596) [29%]	12,484 (+3,376) [37%]	32,409 (+10,223) [46%]
VRM Class III	14 (+4) [46%]	50,393 (-3,681) [-7%]	78,771 (+12,839) [19%]	420,064 (+137,409) [49%]
VRM Class IV	 (+) [0%]	1 (-8) [-88%]	94,557 (-16,273) [-15%]	2,071,396 (-147,866) [-7%]
Total	***7,002*** ***(+1) [0%]***	***66,413*** ***(-1) [0%]***	***185,842*** ***(-36) [0%]***	***2,523,897*** ***(-234) [0%]***

When compared with the No Action Alternative, management actions under Alternative C would maintain the areas considered for designation as VRM Class I and II within VRI Class I (the same as Alternatives A and B), and increase the areas considered for VRM Class I and II designation by over 3,687 acres within VRI Class II. These increases would be beneficial for visual resources in the long term because, as discussed under Alternatives A and B, areas with very high scenic quality would be preserved and there would be an increase in scenic quality and visual values preservation or maintenance within known very high and high-quality landscapes.

The following three tables for scenic quality, sensitivity rating, and distance zones show the proposed VRM class acreages within the VRI scenic quality ratings areas, sensitivity ratings areas, and distance zone areas for Alternative C (Table 4-115 through Table 4-117). Acreage changes and percentages of acreage change (parentheses and brackets), either increased or decreased, are the comparisons to the No Action Alternative.

Table 4-115. VRM Classes by VRI Scenic Quality Ratings in Alternative C

VRM Class	Scenic Quality Ratings		
	A	B	C
VRM Class I	2,898 (+34) [1%]	4,242 (+80) [2%]	0
VRM Class II	6,738 (+2,016) [43%]	34,233 (+8,469) [33%]	17,994 (+7,330) [69%]
VRM Class III	24,162 (-2,041) [-8%]	207,136 (+32,657) [19%]	315,375 (+116,034) [58%]
VRM Class IV	0 (-9) [-100%]	206,084 (-41,256) [-17%]	1,949,206 (-123,455) [-6%]
Total	***33,798*** ***(+) [0%]***	***451,695*** ***(-50) [0%]***	***2,282,575*** ***(-91) [0%]***

Table 4-116. VRM Classes by VRI Sensitivity Ratings in Alternative C

VRM Class	VRI Sensitivity Rating		
	Low	Medium	High
VRM Class I	7,171 (+113) [2%]	(+) [0%]	(+) [0%]
VRM Class II	21,291 (+2,092) [11%]	32,464 (+8,128) [33%]	6,984 (+6,955) [24152%]
VRM Class III	59,218 (-2,061) [-3%]	397,549 (+82,064) [26%]	90,933 (+66,639) [274%]
VRM Class IV	266 (-149) [-36%]	734,287 (-90,189) [-11%]	1,429,702 (-73,711) [-5%]
Total	***87,946 (-5) [0%]***	***1,164,300 (+4) [0%]***	***1,527,619 (-117) [0%]***

Table 4-117. VRM Classes by VRI Distance Zones in Alternative C

VRM Class	VRI Distance Zones		
	Foreground-Middleground	Background	Seldom Seen
VRM Class I	3,674 (+102) [3%]	266 (+5) [2%]	3,228 (+6) [0%]
VRM Class II	29,876 (+10,668) [56%]	6,171 (+1,523) [33%]	24,741 (+4,997) [25%]
VRM Class III	217,484 (+49,988) [30%]	54,473 (+19,576) [56%]	277,294 (+77,017) [38%]
VRM Class IV	563,100 (-51,685) [-8%]	328,573 (-19,747) [-6%]	1,178,213 (-92,769) [-7%]
Total	***814,134 (+9,073) [1%]***	***389,483 (+1,357) [0%]***	***1,483,476 (-10,749) [-1%]***

Visual Resource Management Analysis

Management actions under Alternative C would designate 7,171 acres as VRM Class I and 60,791 acres as VRM Class II. The combined acreage of these classes would total 67,962 acres (or 2.44% of the planning area) to preserve or protect visual resources and scenic quality. Management under VRM Class III and IV objectives would encompass 2,715,595 acres (or 97.55% of the BLM-administered planning area) to permit moderate to major changes to the visual landscape.

Compared to the current management decisions under the No Action Alternative, there would be an increase of 113 acres of VRM Class I protection with direct, beneficial, and long-term impacts to visual resources and visual values because more surface acreage would be protected to preserve pristine, high-quality scenic values. There would be 17,178 acres designated for protection under VRM Class II objectives than the No Action Alternative, which would have direct, long-term, beneficial impacts to scenic quality because more acres would be proposed for protection of high-quality landscapes. Areas managed for protection of scenic quality under VRM Class II objectives would be acreages within numerous proposed ACECs, a 1-mile-wide visual buffer on either side of Dark Canyon Road, and segments along the Black River. Under Alternative C, management actions would require that all permanent lighting within VRM Class II and III areas with sensitive receptors be hooded or downward facing to reduce skyglow and nighttime light pollution. Sensitive receptors would be people living in or near these areas that would be sensitive to visually intrusive nighttime light pollution or skyglow. Sensitive receptors would include campgrounds, residential areas, and nearby communities.

Impacts from Alternative D

Visual Resource Inventory Analysis

Table 4-118 shows the acres of proposed Alternative D VRM classes within the VRI classes. The numbers in parentheses show the changes of acreage, either increased or decreased, when compared to the No Action Alternative acreages.

Table 4-118. VRM Classes by VRI Class for Alternative D

VRM Class	VRI Class I	VRI Class II	VRI Class III	VRI Class IV
VRM Class I	6,985 (+1) [0%]	126 (+91) [261%]	30 (+22) [285%]	28 (+) [0%]
VRM Class II	1 (-7) [-87%]	8,384 (-3,913) [-32%]	9,066 (-42) [0%]	23,638 (+1,452) [7%]
VRM Class III	15 (+5) [56%]	57,899 (+3,825) [7%]	77,697 (+11,765) [18%]	410,506 (+127,851) [45%]
VRM Class IV	 (+) [0%]	6 (-3) [-31%]	99,054 (-11,776) [-11%]	2,089,744 (-129,518) [-6%]
Totals	***7,001*** ***(+) [0%]***	***66,415*** ***(+1) [0%]***	***185,847*** ***(-31) [0%]***	***2,523,916*** ***(-215) [0%]***

When compared with the No Action Alternative, management actions under Alternative D would maintain the areas considered for designation as VRM Class I and II within VRI Class I, and decrease the areas considered for VRM Class I and II designation by 3,822 acres within VRI Class II. This would be adverse for visual resources in the long term because there would be a potential loss of scenic quality and visual values preservation or maintenance within known very high-quality, sensitive scenic landscapes.

The following three tables for scenic quality, sensitivity rating, and distance zones show the proposed VRM class acreages within the VRI scenic quality ratings areas, sensitivity ratings areas, and distance zone areas for Alternative D (Table 4-119 through Table 4-121). Acreage changes and percentages of acreage change (parentheses and brackets), either increased or decreased, are the comparisons to the No Action Alternative.

Table 4-119. VRM Classes by VRI Scenic Quality Ratings in Alternative D

VRM Class	Scenic Quality Ratings		
	A	B	C
VRM Class I	2,898 (+34) [1%]	4,242 (+80) [2%]	0
VRM Class II	6,738 (+2,016) [43%]	22,555 (-3,209) [-12%]	10,006 (-658) [-6%]
VRM Class III	24,158 (-2,045) [-8%]	211,674 (+37,195) [21%]	307,680 (+108,339) [54%]
VRM Class IV	5 (-4) [-44%]	213,232 (-34,108) [-14%]	1,964,905 (-107,756) [-5%]
Total	**33,799** **(+1) [0%]**	**451,703** **(-42) [0%]**	**2,282,591** **(-75) [0%]**

Table 4-120. VRM Classes by VRI Sensitivity Ratings in Alternative D

VRM Class	VRI Sensitivity Rating		
	Low	Medium	High
VRM Class I	7,171 (+113) [2%]	0	0
VRM Class II	10,223 (-8,976) [-47%]	29,360 (+5,024) [21%]	1,469 (+1,440) [5001%]
VRM Class III	70,288 (+9,009) [15%]	384,207 (+68,722) [22%]	90,075 (+65,781) [271%]
VRM Class IV	268 (-147) [-35%]	750,750 (-73,726) [-9%]	1,436,082 (-67,331) [-4%]
Total	***87,950*** ***(-1) [0%]***	***1,164,317*** ***(+21) [0%]***	***1,527,626*** ***(-110) [0%]***

Table 4-121. VRM Classes by VRI Distance Zones in Alternative D

VRM Class	VRI Distance Zones		
	Foreground-Middleground	Background	Seldom Seen
VRM Class I	3,674 (+102) [3%]	266 (+5) [2%]	3,228 (+6) [0%]
VRM Class II	18,043 (-1,165) [-6%]	3,884 (-764) [-16%]	19,161 (-583) [-3%]
VRM Class III	222,743 (+55,247) [33%]	53,939 (+19,042) [55%]	269,444 (+69,167) [35%]
VRM Class IV	569,683 (-45,102) [-7%]	331,398 (-16,922) [-5%]	1,191,655 (-79,327) [-6%]
Total	***814,143*** ***(+9,082) [1%]***	***389,487*** ***(+1,361) [0%]***	***1,483,488*** ***(-10,737) [-1%]***

Visual Resource Management Analysis

Under this alternative (see Table 4-101), there would be the same acreage designation under VRM Class I as discussed for Alternative C (7,171 acres). Designation under VRM Class II would be 41,092 acres (1.47% of the planning area), for a total of 48,263 acres (1.68% of the planning area) under these VRM classes. The combined designated area for VRM classes III and IV would be 2,735,321 acres (or 98.32% of the BLM-administered planning area).

Compared to the current VRM management decisions under the No Action Alternative, there would be fewer acres managed for protection of high-quality landscapes under VRM Class I and II objectives. The impacts for visual resources managed VRM Class I objectives would be the same as discussed under Alternative C because they are the same; designated acreage under VRM Class II for this alternative compared to the No Action Alternative would be adversely decreased by 2,521 acres (0.09% of the planning area), with a corresponding increase in acreages managed under VRM Class III and IV. The areas managed under VRM Class II objectives would be the Lonesome Ridge and Serpentine Bends ACECs, a 0.25-mile-wide visual buffer on either side of the Dark Canyon Road. There would be long-term adverse impacts to visual resources from a decrease in scenic quality protection under both VRM Class II objectives, when compared to the No Action Alternative. Under this alternative, there would be no management action requirements for hooded or directed lighting.

Summary of Direct and Indirect Impacts

See Table 4-101 above for a concise summary comparison of proposed VRM class acreage designations under each of the alternatives.

Impacts from the No Action Alternative

Under this alternative, the current conditions for the resource in the 1988 Carlsbad RMP, 50,671 acres would be managed for the highest degrees of scenic quality preservation under VRM Class I and II objectives. The alternative would continue to manage 2,733,187 acres for moderate and major landscape changes under VRM Class III and IV.

Impacts from Alternative A

Alternative A would provide the second highest degree of resource protection under VRM Class I and II objectives (greater than Alternatives C and D) for long-term, beneficial preservation of scenic quality (273,710 acres).

Impacts from Alternative B

This alternative would have the greatest degree of long-term, beneficial impacts on visual resources because more acres would be protected under VRM Class I and II (357,802 acres) than the other action alternatives.

Impacts from Alternative C

Alternative C would have more long-term, beneficial impacts to visual resources than Alternative D, but less than Alternatives A and B, because 67,962 acres would be designated under VRM Class I and II objectives.

Impacts from Alternative D

When comparing the action alternatives, Alternative D would have the lowest degree of long-term beneficial impacts on visual resources because the least area would be proposed for visual resources preservation under VRM Class I and II (48,263 acres); it would be more adverse to long-term preservation of scenic quality and visual resources than the No Action Alternative because fewer acres would be preserved under VRM Class II objectives.

Impacts of Other Resource Actions on Visual Resources

As mentioned in the Methods and Assumptions subsection above, one of the major assumptions for analysis of visual resources is that proposed resource actions and activities, at both the programmatic and project levels, within an area with a designated VRM class must conform to and not exceed the visual resource objectives permitted under that VRM class. These constraints are described above in the Methods and Assumptions subsection. For example, if a scenic ACEC within the planning area is designated as having VRM Class II objectives, then all minerals leasing, minerals exploration and development projects, recreational infrastructure development, travel route designations and maintenance, utility ROWs construction, or any other surface disturbances must be constructed and/or the effects of construction mitigated so that they meet the long term VRM Class II objectives of the ACEC.

But it should be noted that these resource activities, whether they take place within VRM Class II, III, or IV areas, would still have some surface-disturbance-related impacts and produce changes to scenic quality and visual sensitivity because of the inevitable short- and long-term disturbances caused by human presence, equipment, and/or vehicles. Some form, line, color, and textures alterations would be produced.

4.2.10.2.2 Resources Eliminated from Further Impact Analysis

Cultural Resources – Cultural actions include the development of management plans to protect cultural resource complexes and sites, mitigate damage to cultural resources, and nominate eligible sites for the NRHP. Management actions would also solicit research for identification, monitoring, and data gathering of cultural resources. These actions would have no direct impact on visual values because there are no specific actions that affect an area's visual sensitivity or scenic quality.

Paleontological Resources – These resource actions include stipulations on the collection of vertebrate and invertebrate fossils, which would not affect visual values because public fossil collecting would not cause obvious surface disturbances nor change an area's visual contrasts, sensitivity, or scenic quality.

Water Resources – Water resources actions would evaluate flood hazards in the planning area and seek to reduce flood risks, watershed management plans would be developed, water rights would continue to be acquired as needed to continue public land management, and injection wells would not be permitted in freshwater aquifers. There would be no impact on visual values because these actions would not alter the landscape.

Air Quality – Under all of the alternatives, management actions would require that the CFO continue to meet U.S. Environmental Protection Agency (EPA)-based air quality standards. This would have no impact on visual values because the regulations are currently enforced and would continue to be enforced in the future.

Cave and Karst – Management actions under all of the alternatives would protect cave and karst resources and the area's immediately surrounding cave entrances. These actions would not affect visual values because the resource is underground.

Health and Safety – Management actions for this resource focus on buried and unburied pipelines, subsidence, increased traffic, and on protecting the public from toxic releases of hydrogen sulfide gas and explosive gases. These actions would not affect visual values because the actions are proposed to protect human health, and thus are not related to landscape scenic quality or visual sensitivity.

Land Tenure – Management actions would acquire easements, acquire and/or exchange lands, and withdraw or dispose of lands within the planning area. These actions would have no impact on visual values, visual sensitivity, or scenic quality at the RMP programmatic level of analysis.

Noxious Weeds – Actions common to all of the alternatives would follow BLM management prescriptions for treating noxious and invasive weed species with herbicides, and mechanical methods. These actions would have no impacts on visual resources in the long term because they would not change visual values, long term scenic quality, or the public's sensitivity to landscapes.

The effects of other resource management actions and activities on visual resources are described below.

4.2.10.2.3 Impacts of Minerals Actions on Visual Resources

Impacts Common to All Alternatives

The construction of minerals-related surface disturbances, infrastructure, roads, well heads, and transmission pipelines, where permitted within VRM Class II, III and IV areas, under the No Action and all of the action alternatives would adversely reduce the visual sensitivity of BLM-administered and other federally managed lands, state-owned, and privately owned landscapes and adversely reduce the scenic quality of those landscapes within the planning area. This would occur because, while activities must comply with the designated VRM objectives, lands adjacent to areas open to minerals activities (that may have higher VRM objectives) would also be affected. As discussed in the Trends subsection of Visual Resources in Section 3.2.11.3, industrial development (including minerals exploration and extraction) are major modifiers of the landscape within the planning area on BLM-administered and private lands. The trend indicates a continuing adverse reduction in scenic quality and a decline in visual sensitivity in the long term, creating an increasing (and adverse) scarcity of high scenic quality landscapes within the planning area.

4.2.10.2.4 Impacts of Wildland Fire Actions on Visual Resources

Under all of the action alternatives and the No Action Alternative, prescribed fires and controlled wildland fires would have short-term and long-term impacts on visual resources. In the short-term, fires would create strong line, color, and texture contrasts within the burned areas and on the surrounding landscape. The impacts would be adverse because scenic quality would be reduced from loss of vegetation and from scorched-surface disturbances. Adverse, indirect impacts would be produced and scenic quality would be degraded until vegetation regrowth and the visible signs of firefighting became less noticeable. The long-term impacts would be beneficial because vegetation regrowth would create scenically interesting and contrasting lines, colors, and textures of burned, unburned, and different vegetation types. Beneficial impacts would also be created by increasing public sensitivity to these areas from a heightened awareness of the potential loss from wildland fire.

4.2.10.2.5 Impacts of Land Use Authorizations Actions on Visual Resources

Under the No Action Alternative and all of the action alternatives, land use authorization actions would have long term adverse impacts on visual resources. As discussed above under minerals resources, while land use authorizations (e.g., establishing ROW utility corridors, authorizations for future projects) would comply with designated VRM class objectives, the impacts on visible, surrounding landscapes that possess higher scenic quality or higher VRM objectives from constructing within the ROWs, creating high power lines or liquid mineral transmission lines, or similar authorized projects would be adverse. The adverse impacts would be a reduction in scenic quality caused by visually intrusive infrastructure and surface disturbances that impinge on the viewscapes of the surrounding landscapes.

4.2.10.2.6 Impacts of Lands with Wilderness Characteristics Actions on Visual Resources

Under all of the action alternatives, lands designated as having wilderness characteristics management levels would have three levels of management applied to them (see Table 4-22 below). The impacts on visual resources under the protection management level would be beneficial because scenic quality would be preserved and public sensitivity to these areas would likely be increased because of the relative scarcity of undeveloped landscapes within the planning area. The impacts to scenic quality under the multiple use management levels would have adverse impacts on scenic quality because surface disturbances would be allowed that would potentially degrade scenic quality. Under the No Action Alternative, no land would be protected, which would have adverse impacts on visual resources because scenic quality would be lost or degraded and visual sensitivity for these areas would likely be diminished.

Table 4-122. Acres of Lands with Wilderness Characteristics by Alternative and Management Level

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	0	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	0	0	18,964	30,595	0
Emphasizes other multiple uses	0	0	0	30,862	65,446

4.2.10.2.7 Impacts of Special Designations (ACECs) Actions on Visual Resources

Under all of the alternatives, ACECs would be designated for preserving natural or cultural values. The impacts to visual resources would be beneficial in the long term because, as the visual resource trend is toward further loss of and scarcity of scenic quality and high visual values within the planning area (see Section 3.2.11.3), preserving these areas would likely enhance public sensitivity.

4.2.10.2.8 Impacts of Recreation Actions on Visual Resources

All of the alternatives would maintain or create SRMAs to manage recreation activities and user groups. The impacts to visual resources would be beneficial or adverse, depending upon the targeted users and activities. There would be beneficial impacts to scenic quality and visual sensitivity in those SRMAs that limit surface disturbances from OHV use, manage for scenic quality preservation, and limit infrastructure development. There would be adverse impacts in SRMAs that allow surface disturbance and scenic quality degradation.

4.2.10.2.9 Impacts of Backcountry Byways Actions on Visual Resources

Management actions under the No Action Alternative and Alternatives A, B, and C would maintain the landscapes along the 55-mile Guadalupe Backcountry Byway by designating the area for preservation of visual values (under VRM Class II objectives). This would be beneficial to visual resources because scenic quality would be maintained and visual sensitivity would likely be increased for sightseers traveling along this route. Alternative D would have potentially adverse impacts on visual resources because VRM Class III would be designated for landscapes along the route, which would permit moderate surface disturbances that would degrade the surrounding landscapes.

Management actions under the No Action Alternative would not designate the Dark Canyon Backcountry Byway and would manage the area under VRM Class III and Class IV objectives. The impacts would be adverse for visual resources by allowing moderate to major surface disturbances to degrade scenic quality. Under Alternatives A and B, the 9.5-mile Dark Canyon Backcountry Byway would be designated and managed under VRM Class II along a 2-mile buffer to beneficially preserve scenic quality for sightseers traveling along the route. Alternatives C actions would not designate a byway, but VRM Class II would be designated along a 0.5-mile buffer to beneficially protect foreground scenic quality. Alternative D management actions would not designate a byway within the canyon and would manage a one-mile buffer along the road under VRM Class III objectives to allow moderate, adverse surface disturbances to scenic quality.

4.2.10.2.10 Impacts of Livestock Grazing on Visual Resources

Under all of the alternatives, acreage would be managed as either open or closed to livestock grazing. Closed areas would have long-term, beneficial impacts on scenic quality and visual sensitivity because surface disturbances would be reduced, scenic quality would be preserved, and a higher degree of naturalness would be maintained. Areas open to livestock grazing would be potentially adverse for visual resources because of increased soil erosion from soil disturbances and vegetation loss.

4.2.10.2.11 Impacts of Renewable Energy Actions on Visual Resources

Management actions common to all alternatives would adopt the BMPs and programmatic policies in the Wind and Solar Energy EIS Records of Decision (BLM 2012a; National Renewable Energy Laboratory [NREL] 2012). These actions would, at the programmatic level of analysis, have no impact on visual resources. However, under Alternatives A through D, the encouragement of wind energy development in existing or planned areas of surface disturbance, such as transmission corridors, would be beneficial in the long term for visual resources because scenic quality would be maintained by the concentration of wind energy projects in areas where VRM class objectives allow major changes to the landscape.

4.2.10.2.12 Impacts of Riparian Actions on Visual Resources

The No Action Alternative and Alternatives A, B, and C would either prohibit or restrict OHV use in riparian areas, and other surface disturbances would be limited, including minerals development. These actions would be beneficial for visual resources by preserving riparian areas and enhancing scenic quality because surface disturbances would be managed for minimal impact. Alternative D would have less beneficial impacts on visual resources because OHV use in these areas is unspecified.

4.2.10.2.13 Impacts of Special Designations (WSRs and WSAs) on Visual Resources

The impacts of management actions that would designate river segments for WSR status would have beneficial impacts on visual resources because the scenic quality along both sides of designated segments would be maintained for their scenic or wild characteristics. Also, preservation of river segments would likely increase public sensitivity to these areas because of their rarity within the planning area.

Under all of the alternatives, the four WSAs within the planning area would continue until Congress releases these areas from wilderness review. Maintaining these special designation areas in an unimpaired condition would continue to be beneficial to visual resources in the long term because the pristine, natural condition of the WSAs would be maintained

4.2.10.2.14 Impacts of Travel and Travel Management Actions on Visual Resources

Under all of the travel management alternatives OHV travel throughout the planning area would either be limited or closed. Scenic quality under the No Action and the action alternatives would be beneficially maintained and improved by both restricting OHV use to trails and by closing areas to OHV use.

4.2.10.2.15 Impacts of Vegetation Actions on Visual Resources

Actions for all of the alternatives would include protecting trees within migratory and threatened and endangered bird habitat, rangeland restoration would continue in order to maintain and improved habitat for wildlife, and vegetation treatments would include chemical, mechanical, and fire. The impacts to visual resources from these actions would be both adverse and beneficial. The adverse short-term impacts of vegetation treatments are discussed in the Wildland Fire subsection above. The long-term impacts would be beneficial, caused by maintaining wildlife habitat and by treatment-improved wildlife habitat that would increase and maintain scenic quality. Viewer sensitivity would likely increase in these areas, as the visual trend indicates a continuing loss of scenic quality from encroachment of minerals and agricultural development.

4.2.10.2.16 Impacts of Fish and Wildlife Actions on Visual Resources

Under the No Action Alternative and Alternatives C and D, the Birds of Prey Grasslands would be open to renewable energy development projects and to minerals leasing. Surface disturbances from these activities would adversely degrade the area's scenic quality and reduce visual sensitivity for the area. Under Alternatives A and B, the area would be designated as the 349,355-acre Birds of Prey Grasslands ACEC to preserve bird habitat. Minerals leasing would be restricted, and well pads would be reclaimed, which would benefit visual resources by reducing potential surface disturbances and maintaining and enhancing scenic quality.

4.2.11 Air Resources

This section describes the potential impacts to air resources from the implementation of the proposed CFO management alternatives. The evaluation of air resources included:

- near-field and far-field analyses of potential air quality impacts from proposed mineral development, other emission sources, and potential mitigation measures;
- evaluation of proposed mineral development on global climate change; and
- impacts of other resource management actions on air quality where applicable

These analyses are described in the following discussion. Existing conditions concerning air quality are described in Section 3.2.12. The impacts of water, karst, cultural, paleontology, land use, land tenure, riparian, recreation, visual resources and special designations would have negligible impacts on air quality and will not be discussed further in this section.

4.2.11.1 Analysis Methods

The Air Resources Technical Support Document (ARTSD) (URS 2013) describes the data and methodologies used to analyze potential near-field and far-field air quality impacts resulting from future oil and gas development and other sources in the planning area. The goals of the ARTSD are to predict air quality impacts using appropriate models, explain the modeling results, and identify any significant differences among potential oil and gas development alternatives. Additionally, greenhouse gas (GHG) emissions were estimated and compared to existing GHG inventories.

The ARTSD study area focuses on New Mexico's Permian Basin and the planning area for other BLM-administered resources. For regional air quality impacts, the study area extends beyond the CFO planning area and New Mexico borders. The three nested domains used in the regional analyses are shown in Figure 4-1 (CFO 4 km, CFO 12 km, and continental U.S. [CONUS]). The study analyzes activities occurring or projected to occur on BLM-administered lands, but also includes emissions and impacts from sources not located on BLM-administered lands.

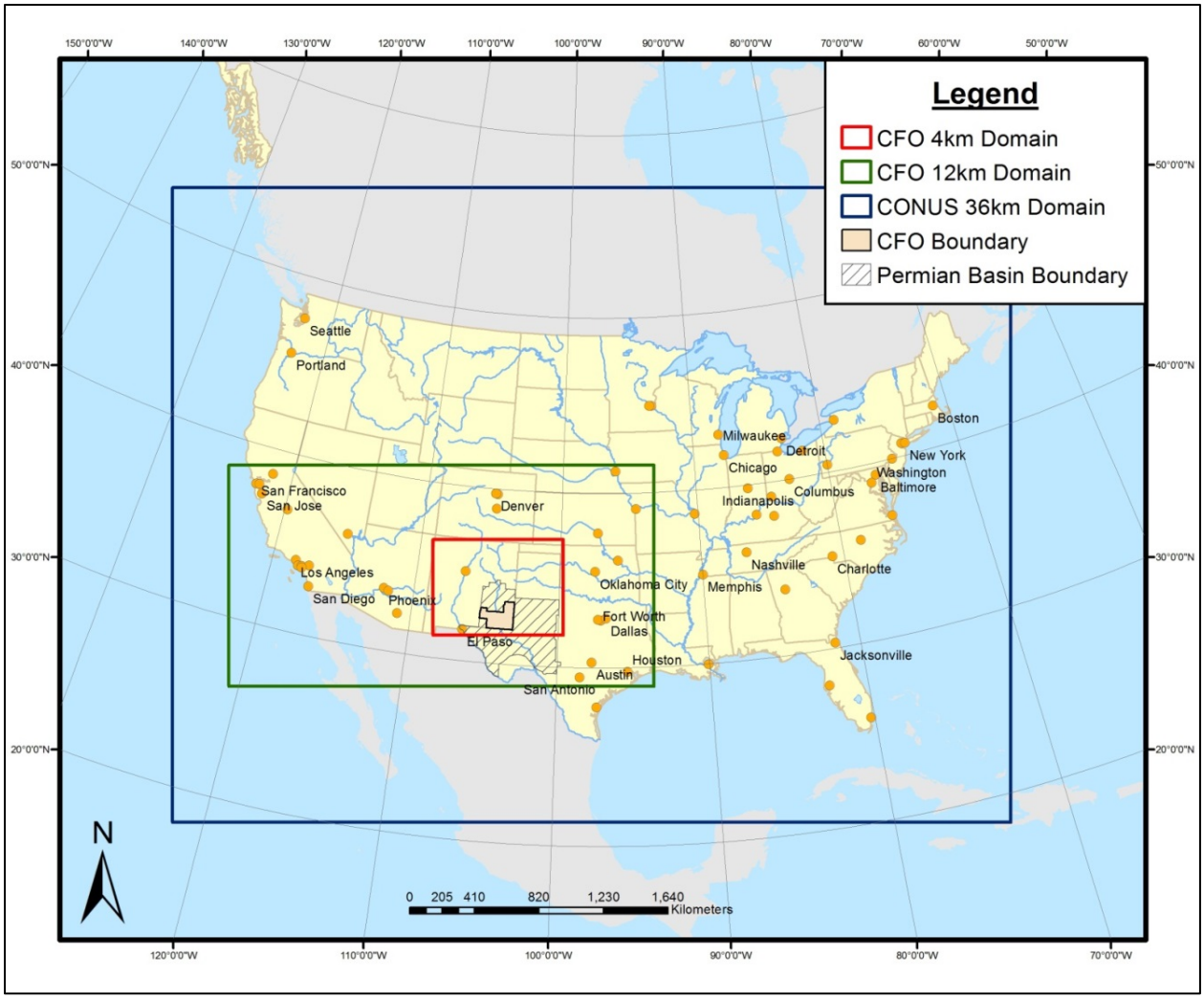

Figure 4-1. Regional Model Domains

The ARTSD focuses on emissions and potential air quality impacts due to oil and gas RFD within the CFO planning area. Up to 15,644 new oil and gas wells could be developed with approximately 3,538 to 6,044 of those wells being developed on federal mineral estate during the 20-year planning horizon. Development of several additional natural gas plants may also occur in the planning area. These values reflect the maximum level of development that can be expected during this time period. Emissions from one CFO RFD mining project are also included in this analysis for determining total CFO multiple resource RFD impacts.

4.2.11.1.1 Indicators

Section 3.3.12, Air Resources, identifies several indicators for evaluation of oil and gas development impacts on air resources: comparison of predicted concentrations to National Ambient Air Quality Standards (NAAQS), New Mexico Ambient Air Quality Standards (NMAAQS), and Prevention of Significant Deterioration (PSD) increments; predicted impacts on Air Quality Related Values (AQRVs); and comparison of predicted hazardous air pollutant (HAP) concentrations to health exposure levels. Action alternatives that are compliant with the NAAQS are assumed to be protective of human health and the environment. A predicted threshold exceedance of an AQRV means that an adverse impact could occur. A predicted exceedance of known health exposure levels means that an adverse impact could occur. The near-field and far-field modeling results were used for the analysis of management impacts.

4.2.11.1.2 Methods and Assumptions

Management actions associated with each of the resources are discussed below. With the exception of mineral actions, emission inventories have not been developed for each of the resources. Inventories were developed for regional and oil and gas sources, but these inventories were not related to specific resources. In addition, the far-field modeling results do not contain detailed results by emission source. Consequently, only a qualitative analysis was performed for each of the other resources.

The assumptions considered for analysis include the following:

- The hypothetical near-field source analyses are a conservative estimate of impacts from oil and gas development. Near-field ambient air models of criteria pollutants and HAPs were created with AERMOD to assess potential impacts from oil and gas related construction and production activities. To estimate potential near-field emissions, 49 facilities within a 2 × 2–mile area were grouped together for AERMOD modeling under two scenarios.
- For the far-field analysis, the CAMx photochemical grid model analyses are a conservative estimate of impacts to ambient ground-level concentrations resulting from air emissions in the planning area.
- The base year is 2008 and the emission inventory was developed to portray emissions at various temporal and spatial scales.
- The future year analyzed is 2028. The 2017 base case inventory was assumed to represent 2028 emissions for the No Action Alternative.
- Two modeling scenarios (alternatives) were performed as a part of this analysis. The first scenario includes the future year base case emissions, plus the BLM oil and gas emissions inventory on-the-books emissions control regulations. The second scenario includes all the sources and controls in the first scenario, plus accounts for additional BLM-approved emissions controls in the planning area for oil and gas sources. The first scenario is assumed to represent Alternatives C and D, and the second scenario is assumed to represent Alternatives A and B. Both scenarios contained emissions from 10,117 active BLM oil and gas wells and 20,379 non-BLM oil and gas wells. The maximum number of wells in the modeling analysis for the planning area is much greater than the number of wells projected for the planning area (3,538 to 6,044 wells on BLM-administered lands and 9,600 wells on non-BLM-administered lands).

4.2.11.2 Direct and Indirect Impacts

Both direct and indirect impacts to air resources occur primarily as the result of oil and gas development and other surface- and subsurface-disturbing activities in the planning area. Emissions increases resulting from construction and operation of the facilities are direct impacts. Indirect impacts include increased traffic throughout the planning area and combustion of the oil and gas. Potential impacts to air resources associated with oil and gas development are discussed in greater detail below in the Minerals section.

Many of the resource areas have proposed management and travel-related decisions that limit or reduce surface and vegetation disturbance, increase vegetation and habitats, limit or reduce OHV and other off-trail access, and improve existing roadway and trail surfaces. To the extent that these decisions reduce emissions, there may be an insignificant positive impact on air quality. With the exception of mineral actions, each of the resource management actions is analyzed in a qualitative fashion in separate sections below.

4.2.11.3 Impacts of Air Quality Actions

Chapter 2 identifies actions specifically designed to manage activities and development within the planning area to protect and improve air quality and, within the scope of the BLM's authority, minimize emissions that 1) cause or contribute to violations of air quality standards, 2) that negatively impact AQRVs, and 3) are GHGs. Management actions would reduce air resource impacts from oil and gas development on BLM-administered lands in the planning area. The following discussion presents a qualitative evaluation of air quality actions. A quantitative evaluation of air quality impacts is presented in the Impacts of Mineral Actions on Air Quality Section.

4.2.11.3.1 Impacts from Management Common to All

In total, 9,600 new oil and gas wells on non-BLM-administered lands are projected for all alternatives. The number of wells on BLM-administered lands varies by alternative. At a minimum for all alternatives, the oil and gas facilities would be required to comply with current regulatory requirements. Projected emissions common to the No Action Alternative and all development scenarios include particulate matter with an aerodynamic diameter less than a nominal 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter less than a nominal 2.5 micrometers ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NO_x), volatile organic compounds (VOCs), hydrogen sulfide (H_2S), and GHGs.

While air emissions from either fracing or conventional drilling methods are generally similar, fracing has opened new opportunities for oil and gas production, and associated air emissions from construction, drilling, and operations due to the ability to extract oil and gas product in areas previously considered inaccessible or too costly. This increased opportunity for oil and gas development is reflected in the number of wells predicted. Additionally, truck traffic associated with fracing operations is higher than conventional drilling methods due to the need for water and fracing fluids. The amount of water per well varies greatly but an American Geophysical Union study provides a range for the New Mexico Permian Basin of 1,001–10,000 m^3/well (264,426–2,641,721 gallons/well) (AGU 2015). This water would be trucked or piped in. Emission sources associated with oil and gas development include fugitive dust and vehicle exhaust emissions from construction, drilling (hydraulic fracturing and conventional), and operations; vehicle travel and reclamation activities; fuel combustion emissions from drilling, completions, compressor and oil pump engines, flares, combustors, and heaters; and VOC and HAP emissions from glycol dehydrators, storage tanks, process piping fugitive emissions from facility components, pneumatic controllers, natural gas venting, and other ancillary sources. Other emission sources considered in the air quality analyses include stationary area sources, non-road mobile sources, on-road mobile sources, non-oil and gas point sources, and biogenic sources.

The following regulatory requirements apply to all alternatives:

Each existing and new oil and gas facility is required to submit a NOI or Construction Permit Application to the New Mexico Environment Department (NMED) if potential emissions of any regulated air contaminant exceed 10 tons per year.

New and modified centrifugal or reciprocating compressors at gas gathering and boosting stations, well sites, and gas processing plants would be required to meet the requirements of applicable EPA and NMED requirements and standards. These requirements would reduce VOC and HAP emissions by a significant amount for all alternatives, compared to compressors constructed or modified prior to August 23, 2011.

New and modified natural gas sweetening units at natural gas processing plants would be required to meet the requirements of applicable EPA and NMED regulations addressing emissions from sweetening units. These requirements would reduce SO_2 emissions from the sweetening units at the facilities by a significant amount for all alternatives, compared to sweetening units installed prior to August 23, 2011.

New drill rig and fracturing pump engines would be required to meet current New Mexico and EPA Tier 4 Nonroad Diesel Engine Emission Standards.

Operators must comply with all applicable EPA NSPS regulations, including those limiting emissions during well completions. Operators must also comply with all applicable BLM regulations pertaining to the venting and flaring of gas.

Hydrocarbon storage tanks are required to meet the requirements of New Mexico Administrative Code (NMAC) 20.2.38 Hydrocarbon Storage Facilities.

Fugitive emissions which is the collection of fugitive emissions components at well sites or compressor stations, would be required to meet the requirements of applicable EPA and NMED regulations. These requirements would address GHG and VOC emissions from the fugitive components.

Equipment leak emissions at onshore natural gas processing plants, would be required to meet the requirements of applicable EPA and NMED regulations. These requirements would address GHG and VOC emissions from leaking components.

Glycol dehydrators located at well sites, gathering and boosting stations, gas processing plants, and natural gas transmission stations would be required to meet applicable National Emission Standards for Hazardous Air Pollutants (NESHAP) for Oil & Natural Gas Production (40 CFR Part 63, Subpart HH).

Diesel engines and natural gas fired engines would be required to meet the applicable NESHAP for Stationary Reciprocating Internal Combustion Engines (40 CFR Part 63, Subpart ZZZZ), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60, Subpart IIII), or Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (40 CFR Part 60, Subpart JJJJ), as applicable based on engine type and date of manufacture.

4.2.11.3.2 Impacts from Management Common to All Action Alternatives

The following management actions are common to all action alternatives.

- During drilling, socks should be put on vent lines when transferring cement from bulk trucks to silos and when blowing down silos into bulk trucks. This management action would reduce particulate emissions during drilling activities.
- Existing drill rig, completion rig, work-over rig, and fracturing pump engines would be required to meet current New Mexico and within 1 year of the ROD, EPA Tier 4 Nonroad Diesel Engine Emission Standards. Because the Tier 4 standards would be applied to existing engines, this management action would further reduce NO_x, VOC, and particulate emissions below levels required by current regulations. Tier 4 regulations also require a reduction in fuel sulfur content to 15 parts per million; however, this reduced sulfur content is currently widely used and is therefore, expected to have minimal further impact to ambient sulfur reductions.
- The actions authorized on BLM-administered land and federal minerals would comply with the Clean Air Act and State Implementation Plan requirements,and would follow BMPs to ensure air quality is maintained below NAAQS/NMAAQS thresholds. The BLM would evaluate effects to air quality at the activity planning level and prepare detailed monitoring and mitigation prescriptions for proposals that could degrade air quality.
- VRUs would be required on new wells and production facilities on a case-by-case basis as determined by the BLM. A VRU is effective in controlling emissions when there is sufficient and consistent gas flow. If the flow is insufficient, the VRU would be less effective or not effective for controlling emissions. This action would require controls for facilities that otherwise would not need additional controls under current regulatory requirements. This action would reduce GHGs, VOCs, and HAPs by a significant amount for facilities with sufficient flow when compared to current regulatory requirements and the No Action Alternative.

4.2.11.3.3 Impacts from the No Action Alternative

Under the No Action Alternative, existing management under the current 1988 Carlsbad RMP as amended in 1997 and 2008 would be continued. Oil and gas activity would continue and increase with the addition of 5,874 new wells projected on BLM-administered lands. Other emission sources considered in the air quality analyses include stationary area sources, non-road mobile sources, on-road mobile sources, non-oil and gas point sources, and biogenic sources. Stipulations would be incorporated into project proposals to meet air quality standards.

4.2.11.3.4 Impacts from Alternative A

Under Alternative A, 4,465 new wells on BLM-administered lands are projected, 1,409 fewer than for the No Action Alternative. The following management actions require additional controls to decrease emissions.

Vapor recovery units (VRUs) would be required on all new wells and production facilities. A VRU is effective in controlling emissions when there is sufficient and consistent gas flow. If the flow is insufficient, the VRU would be less effective or not effective for controlling emissions. This action would require controls for facilities that otherwise would not need additional controls under current regulatory requirements. This action would reduce GHGs, VOCs, and HAPs by a significant amount for facilities with sufficient flow, when compared to current regulatory requirements and the No Action Alternative.

New and existing drill rig, completion rig, work-over rig, and fracturing pump engines would be required to meet EPA Tier 4 Nonroad Diesel Engine Emission Standards or equivalent emission standards, regardless of when they begin operation in the planning area or when the engine was constructed. For existing engines, this requirement would be effective 1 year of the ROD. This action would reduce exhaust emissions from the engines that would otherwise not be required to meet the more stringent EPA Tier 4 standards but would have no effect on those that are already subject to those standards. This action would therefore significantly reduce exhaust emissions as compared to the No Action Alternative.

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During construction activities (including well drilling, completion, and work-over), twice daily watering (or equivalent) of construction areas and associated resource roads would be required to prevent at least 50% of fugitive dust from vehicular traffic, equipment operations, or wind events. The Authorized Officer may direct the operator to change the level and type of treatment if dust abatement measures are observed to be insufficient to prevent fugitive dust. In addition, fugitive dust control plans would be required. These requirements would reduce particulate emissions during construction by a significant amount as compared to the No Action Alternative.

Emission controls such as vapor recovery, flare, or other combustion device would be required for oil tanks, condensate tanks, and produced water tanks, without regard to the quantity of uncontrolled VOC emissions from the equipment. VOC and HAP emissions from oil tanks, condensate tanks, and produced water tanks would be reduced by at least 95% from uncontrolled emission levels. Low emitting tanks are often difficult to control effectively due to low or inconsistent oil throughputs and a flare or other combustion device may be the only feasible control option. Combustion controls would reduce VOC and HAP emissions, but would add NO_x and carbon monoxide (CO) emissions. Therefore, this action would likely provide significant VOC and HAP emission reductions for tanks not otherwise controlled as compared to the No Action Alternative, but may increase NO_x and CO emissions, with the greatest benefit coming from emission reductions on older high emitting tanks.

In addition to EPA NESHAP (40 CFR Part 63, Subpart HH) applicable to glycol dehydrators, emission controls would be required for glycol dehydrators, without regard to the location of the equipment or the quantity of uncontrolled VOC emissions from the equipment. VOC and HAP emissions from glycol dehydrators would be reduced by at least 95% from uncontrolled emission levels for dehydrators that would otherwise not be subject to control requirements. The greatest emission reductions would likely be seen at oil and gas production facilities, which often have small dehydrators (less than 3 million standard cubic feet per day), and at facilities with dehydrators that are otherwise only regulated at facilities that are major sources of HAPs (ethylene glycol and diethylene glycol dehydrators). This management action is expected to have less of a benefit at compressor stations and natural gas processing plants because many dehydrators at these facilities already have regulatory control requirements, although 95% control is frequently not required. To achieve 95% control of VOC and HAPs, a flare or other combustion device is often required. Combustion controls would reduce VOC and HAPs emissions, but would add NO_x and CO emissions. When compared to current regulatory requirements and the No Action Alternative, this management action would decrease VOC and HAP emissions but may increase NO_x and CO emissions.

At least 70% of gas compression at compressor stations (gathering, boosting, transmission, and gas plants) and gas and oil well head pumps would be powered by electricity. Any new electricity transmission lines would be buried underground in existing ROWs. This requirement would reduce exhaust emissions from compressor and pump engines by 70% because the compressors and pumps would otherwise be driven by natural gas-fired engines.

4.2.11.3.5 Impacts from Alternative B

Under Alternative B, 3,538 new wells on BLM-administered lands are projected, 2,335 fewer than for the No Action Alternative.

The management actions under Alternative B are identical to those described above under Alternative A. A small incremental positive impact on air quality is expected for Alternative B due to 927 fewer wells as compared to Alternative A. Similar to Alternative A, a positive air quality impact is expected as compared to the No Action Alternative due to management actions that are above and beyond the federally mandated requirements.

4.2.11.3.6 Impacts from Alternative C

Under Alternative C, 5,832 new wells on BLM-administered lands are projected, 41 fewer than for the No Action Alternative.

Overall, certain equipment at the oil and gas facilities would be required to meet regulatory requirements in both the No Action Alternative and Alternative C. Because fewer wells are projected for Alternative C, there may be a significant air quality benefit between the two alternatives.

4.2.11.3.7 Impacts from Alternative D

Under Alternative D, 6,044 new wells on BLM-administered lands are projected, 170 more than for the No Action Alternative.

Overall, certain equipment at the oil and gas facilities would be required to meet regulatory requirements in both the No Action Alternative and Alternative D, resulting in no significant air quality benefit between the two alternatives for each facility. Because more wells are projected for Alternative D, there may be a small negative impact under Alternative D, compared to the No Action Alternative. Local atmospheric dispersion characteristics such as elevation differences would contribute, either negatively or positively, to the impacts from the additional wells as compared to air quality standards.

4.2.11.4 Impacts of Soils Actions on Air Quality

Management actions for soils (Appendix L) are generally projected to result in increased vegetation (density and height) and lower overall surface/soil disturbance and wind and water surface erosion.

Proposed management decisions generally include limiting surface occupancy on open dunes and unsuitable slopes, reclaiming disturbed sites in sensitive areas, increasing vegetation cover, and lowering overall surface/soil disturbance. Direct air quality impacts from soils actions would likely be small and most noticeable in a cumulative fashion when coupled with other management actions. Potential effects from these management decisions include improved vegetative cover in many areas.

Short-term benefits to air quality would most likely not be measurable in the overall planning area. Long-term benefits would include incremental site-specific reductions in windborne particulate from reduced erosion of exposed soils as vegetation improves over time.

4.2.11.5 Impacts of Fish and Wildlife Actions, Special Status Species, Vegetation and Noxious Weeds and Invasive Species on Air Quality

Management actions for fish and wildlife are generally projected to result in increased vegetation composition, cover, production, lower overall surface/soil disturbance, and wind and water surface erosion as habitat is improved. Direct air quality impacts from vegetative community actions would likely be small and most noticeable in a cumulative fashion when coupled with other management actions. Potential effects from these management decisions include improved vegetative cover in many areas.

Short-term benefits to air quality would most likely not be measurable in the overall planning area. Long-term benefits would include incremental site-specific reductions in windborne particulate from reduced erosion of exposed soils as vegetation improves over time.

4.2.11.6 Impacts of Wildland Fire and Fuels Management Actions on Air Quality

It is estimated that 19,500 acres of vegetation would be subject to prescribed burning each year. Short-term air quality effects projected from prescribed burns include a general increase in particulate matter and CO emissions specific to the burn area and locations downwind. The magnitude of increase is directly dependent on the size, extent, and controlled level of the burn. The type and amount of air pollutants released from burning wildland vegetation varies with type of fuel, moisture content, temperature of the fire, and the amount of smoldering occurring after the fire. Because prescribed burning occurs irregularly, it is generally possible to restrict burning on "bad air quality days" to avoid violating air quality standards.

Long-term direct air-quality effects projected from prescribed burns include a general increase in airborne particulate materials from the burn site as a result of ash dispersion and transport. This increase would occur only until revegetation is complete and growth matures.

Short- and long-term indirect effects on air quality from prescribed burns include an increase in airborne particulates from the burn sites as a result of wind-based erosion of devegetated areas. This effect is expected to be small, as vegetation management is an active part of fire management techniques. A greater long-term effect of prescribed burning is a reduction in particulate, CO, methane, and nitrous oxide emissions specific to wildfire in unmanaged areas.

Wildfire emissions were included in the air quality analysis using 2008 emission estimates. The detrimental effects from wildfire would likely be greater than those from prescribed fire and exert a larger negative effect on air quality.

4.2.11.7 Impacts of Lands with Wilderness Characteristics Actions on Air Quality

4.2.11.7.1 Impacts from Management Common to All

There are no air quality impacts common to all alternatives.

4.2.11.7.2 Impacts from Management Common to All Action Alternatives

There are no air quality impacts common to all action alternatives.

4.2.11.7.3 Impacts from the No Action Alternative

Under the No Action Alternative, there would be no units managed as lands with wilderness characteristics.

4.2.11.7.4 Impacts from Alternative A

Under Alternative A, 66,666 acres would be managed to protect wilderness characteristics. Eliminating these acres from construction of new roads and the associated vehicle traffic would reduce particulate and exhaust emissions in the planning area compared to the No Action Alternative.

Of the Action alternatives, Alternative A has the largest area to be managed as lands with wilderness characteristics, with more than 1.4 times the acreage of Alternative B, more than 10 times the acreage of Alternative C, and 52 times the acreage of Alternative D. Alternative A is therefore, the most favorable to air quality with respect to managed acreage to protect lands with wilderness characteristics. While there is likely not a direct correlation of managed acreage to beneficial air quality impacts, it is expected that the more acreage that is managed as lands with wilderness characteristics, the greater the local beneficial impact due to reduced surface disturbance.

4.2.11.7.5 Impacts from Alternative B

Under Alternative B, 47,611 acres would be to protect wilderness characteristics. Impacts relative to acres managed is discussed above in Impacts from Alternative A.

4.2.11.7.6 Impacts from Alternative C

Under Alternative C, 5,119 acres would be managed to protect wilderness characteristics. Impacts relative to acres managed is discussed above in Impacts from Alternative A.

4.2.11.7.7 Impacts from Alternative D

Under Alternative D, 1,221 acres would be managed to protect wilderness characteristics. Impacts relative to acres managed is discussed above in Impacts from Alternative A.

4.2.11.8 Impacts of Minerals Actions on Air Quality

The air quality impacts of mineral actions oil and gas development and one mining project on air quality are described below for the near- and far-field modeling analyses.

4.2.11.8.1 Impacts from Management Common to All

There are no BLM management actions common to all alternatives. Each existing and new oil and gas facility is required to submit a NOI or Construction Permit Application to the NMED if potential emissions of any regulated air contaminant exceed 10 tons per year.

4.2.11.8.2 Impacts from Management Common to All Action Alternatives

There are no management actions common to all alternatives.

4.2.11.8.3 Impacts from the Alternatives

The detailed evaluation of impacts from the No Action and action alternatives is presented below.

Near-Field Analysis

Modeling Methodology

The EPA's recommended guideline model, AERMOD (version 12060), was used to assess near-field impacts. Near-field modeling predicted long- and short-term averaged ambient concentrations for the following criteria pollutants: CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$. HAP concentrations and potential human health risk were estimated for benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylenes. In addition, H_2S and total suspended particulate (TSP) concentrations were estimated to address the NMAAQS.

The following list highlights some of the assumptions and methodologies that were applied for the near-field modeling assessment:

- Near-field modeling was not performed for each action alternative. Modeling was performed based on reasonable emissions that could conceivably occur under a restrictive combination of emissions scenarios.
- Near-field modeling was completed for two "typical" near-field (approximately 4-square-mile area) clustered oil and gas layouts. These two analyses were performed because of the clustered oil and gas development that can currently be found in near-field sections (approximately 4-square-mile area) in the Permian Basin: one with minimal natural gas operations (i.e., mostly oil wells), and then a balanced oil and gas scenario (~50% oil and ~50% gas) that can be found within the basin.

The available air quality monitoring data collected in and near the planning area were used to compare changes in air quality contributed by the modeled emission sources. Detailed information on the air quality modeling techniques employed, parameters utilized, and meteorological conditions incorporated is presented in the ARTSD (URS 2013).

Near-Field Assessment of Air Quality Impacts

The maximum predicted concentrations are shown in Table 4-123 and Table 4-124. For all near-field modeled criteria pollutants and averaging times, predicted near field concentrations are below the NAAQS and NMAAQS. The model-predicted 24-hour TSP concentrations are close to the NMAAQS, but do not exceed the standard.

Near-field HAP modeling was based on the same source and receptor layouts as for criteria pollutants. Short-term (1-hour) average HAP concentrations were compared to acute Reference Exposure Levels (RELs). RELs are defined as concentrations at or below which no adverse short-term health effects are expected. No RELs are available for ethylbenzene and n-hexane; instead, the Immediately Dangerous to Life or Health values divided by 10 (IDLH/10) were used.

As shown in the Table 4-125, HAP maximum 1-hour concentrations (with inclusion of background concentrations) are well below the REL or IDLH/10 reference concentrations.

Long-term maximum potential exposure to HAPs is compared to Reference Concentrations for Chronic Inhalation (RfCs) in Table 4-126. An RfC is defined by the EPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both carcinogenic (cancer causing) and non-carcinogenic effects on human health.

Only benzene and formaldehyde are suspected to be carcinogenic. RfCs for these HAPs are expressed as unit risk factors (URFs) and are shown in Table 4-127. Accepted methods for risk assessment were used to evaluate the incremental cancer risk for these pollutants. A cancer risk range of 1 in a million to 100 in a million (10^{-6} to 10^{-4} risk) is generally acceptable. Cancer risks for each individual HAP and for combined exposure to both HAPs for both most likely exposure (MLE) and maximally exposed individual (MEI) are within or below this range.

Table 4-123. Gaseous Maximum Predicted Concentrations

Criteria Pollutant	Avg. Period	Oil Wells Scenario Concentration (µg/m^3)			Balanced Scenario Concentration (µg/m^3)			Ambient Standard (µg/m^3)	
		Modeled	Background	*Total*	Modeled	Background	*Total*	NAAQS	NMAAQS
CO	1-hour	1,356.1	2,400	***3,756***	1,356.1	2,400	***3,756***	40,000	14,971
CO	8-hour	959.8	1,667	***2,627***	960.0	1,667	***2,627***	10,000	9,667
NO_2	1-hour	110.4	56.6	***167***	110.5	56.6	***167***	189	N/A
NO_2	Annual	12.8	5.7	***19***	12.9	5.7	***19***	100	N/A
SO_2	1-hour	35.5	52.8	***88***	35.5	52.8	***88***	196	N/A
SO_2	3-hour	34.8	13.8	***49***	34.8	13.8	***49***	1,300	N/A
H_2S	0.5-hour	74.8	N/A	***75***	46.1	N/A	***46***	N/A	141

µg/m^3 – micrograms per cubic meter.

Table 4-124. Particulate Matter Maximum Predicted Concentrations

Criteria Pollutant	Avg. Period	Oil Wells Scenario Concentration (µg/m^3)			Balanced Scenario Concentration (µg/m^3)			Ambient Standard (µg/m^3)	
		Modeled	Background	*Total*	Modeled	Background	*Total*	NAAQS	NMAAQS
PM_{10}	24-hour	45.5	51.9	***97***	45.7	51.9	***98***	150	N/A
$PM_{2.5}$	24-hour	3.4	16.9	***20***	3.4	16.9	***20***	35	N/A
$PM_{2.5}$	Annual	0.05	6.2	***6.3***	0.1	6.2	***6***	12	N/A
TSP	24-hour	87.2	61.5	***149***	87.8	61.5	***149***	N/A	150
TSP	Annual	0.7	28.1	***29***	0.9	28.1	***29***	N/A	60

µg/m^3 – micrograms per cubic meter.

Table 4-125. 1-Hour Hazardous Air Pollutant Maximum Concentrations Comparison to Reference Exposure Levels

HAP	Oil Wells Scenario Concentration (µg/m^3)			Balanced Scenario Concentration (µg/m^3)			REL (µg/m^3)
	Modeled	Background	*Total*	Modeled	Background	*Total*	
Benzene	16.2	110.1	***126***	32.4	110.1	***143***	1,300
Ethylbenzene	1.0	149.2	***150***	0.7	149.2	***150***	350,000
Formaldehyde	16.6	15.2	***32***	16.6	15.2	***32***	94
n-Hexane	3,016.3	544.5	***3,561***	6,055.7	544.5	***6,600***	390,000
Toluene	280.6	320.9	***602***	556.6	320.9	***878***	37,000
Xylene	273.4	N/A	***273***	541.0	N/A	***541***	22,000

µg/m^3 – micrograms per cubic meter.

Table 4-126. Annual Average Predicted Hazardous Air Pollutant Concentrations Compared to Reference Concentrations for Chronic Inhalation

HAP	Oil Wells Scenario Concentration (µg/m^3)			Balanced Scenario Concentration (µg/m^3)			RfC (µg/m^3)
	Modeled	Background	*Total*	Modeled	Background	*Total*	
Benzene	0.6	6.2	***7***	1.1	6.2	***7***	30
Ethylbenzene	0.1	3.3	***3***	0.1	3.3	***3***	1,000
Formaldehyde	1.3	3.3	***4.6***	1.3	3.3	***4.6***	9.8
n-Hexane	91.2	25.7	***117***	182.7	25.7	***208***	700
Toluene	8.6	13.2	***22***	16.9	13.2	***30***	400
Xylene	8.4	N/A	***8***	16.4	N/A	***16***	100

µg/m^3 – micrograms per cubic meter.

Table 4-127. Cancer Risk from Long-Term Exposure

HAP	Analysis	Carcinogenic RfC URF 1/(µg/m^3)	Exposure Adjustment Factor	Oil Wells Scenario Cancer Risk (in a million)	Balanced Scenario Cancer Risk (in a million)
Benzene	MLE	7.80E-06	0.095	0.4	0.85
	MEI	7.80E-06	0.29	1.2	2.58
Formaldehyde	MLE	5.5E-09	0.095	0.0	0.00
	MEI	5.5E-09	0.29	0.0	0.00
Total Combined	***MLE***	***N/A***	***N/A***	***0.4***	***0.85***
	MEI	***N/A***	***N/A***	***1.2***	***2.58***

N/A = not applicable

Far-Field Analysis

Photochemical grid modeling programs were used to assess impacts to ambient ground-level pollutants resulting from air emissions associated with the planning area. Modeling was performed using a 2008 base case year and emissions growth projections with data reflecting 2017 emissions inventories. The pollutant assessment focuses on impacts throughout the state of New Mexico and nearby surrounding states, although pollutant concentrations were predicted for the contiguous United States.

Three models were used in the planning area assessment. The CAMx photochemical grid model predicted ambient pollutant concentrations based on meteorological data inputs prepared using the Weather Research and Forecasting Model and emissions data prepared using the SMOKE emissions processing system.

The planning area pollutant assessment modeling included three nested domains (4 km, 12 km, and CONUS). The 4-km domain was the focus of the ozone modeling assessment. This domain encompasses the planning area and the entire New Mexico portion of the Permian Basin.

Future Year Emission Inventories

Each of the two future year planning area alternative emission data sets required combining the following types of emissions:

- Year 2017 non-oil and gas reasonably foreseeable future action emissions sets (e.g., mobile, biogenic, etc.)
- Year 2017 non-oil and gas RFD emissions sets
- Year 2028 planning area RMP revision emissions (oil and gas RFD)

The 2017 emission inventories were assumed to represent 2028 emission levels for the No Action Alternative. The 2028 planning area RMP revision emissions were added to the 2017 emissions to obtain the total 2028 emissions. A summary of the emission totals for the future year modeling is presented in Table 4-128. Alternatives A and B were represented by one emission data set and reflect RFD with extra management emission control requirements. Alternatives C and D were represented by a second emission data set with existing emission control requirements. Both scenarios contained emissions from 10,117 active BLM oil and gas wells and 20,379 non-BLM oil and gas wells. The maximum number of wells in the modeling analyses is much greater than the number of new wells projected for the planning area (3,538–6,044 wells on BLM-administered lands, and 9,600 wells on non-BLM-administered lands).

Table 4-128. 2028 Planning Area Emissions for Future Year Modeling

Emissions Scenario	Emissions (tpy)					
	CO	NO_X	VOC	SO_2	PM_{10}	$PM_{2.5}$
No Action Alternative	5,809	7,625	26,475	89	1,603	306
Alternatives A and B	11,014	14,833	33,865	163	2,605	515
Alternatives C and D	11,881	16,510	62,271	163	3,380	630

tpy = short tons per year

Far-Field Assessment of Predicted Ozone and $PM_{2.5}$ Impacts

Ozone

The greatest 8-hour ozone concentration increase due to RMP revision emissions alone is 2.5 parts per billion (ppb). The maximum increase occurs within the planning area. The average daily maximum ozone increase attributable to RMP revision emissions is 0.02 ppb for Alternatives C and D. The maximum difference between Alternatives A and B and Alternatives C and D is 1 ppb, and the average difference is 0 ppb.

Based on calculated design values (DVs) from the base year (2008) predicted concentrations and the future year (2028) predicted concentrations for the 31 ozone monitors in the 4-km domain, the 0.075-part-per-million (ppm) ozone NAAQS is expected to be attained at 21 of the 31 monitors in the 4-km domain for both alternatives data sets including cumulative emissions. Two of the three monitors in the planning area (Carlsbad and Carlsbad Caverns National Park) show an expected exceedance. The highest DV for all monitors (79 ppb) occurs at the Navajo Dam monitor in the Four Corners region.

To summarize, ozone impacts attributable to the RMP revision and cumulative emissions are not expected to cause or contribute to violations of the ozone NAAQS. One-third of the projected DVs in the 4-km domain are above the 75-ppb ozone NAAQS. The projected DVs for the two modeled emission data sets show little to no change from the future year No Action Alternative. In addition, modeled ozone impacts attributable to RMP revision emissions do not extend to any non-attainment areas, when comparing future year modeling results with and without RMP revision emissions.

$PM_{2.5}$

The greatest 24-hour average $PM_{2.5}$ concentration increase due to RMP revision emissions is 3.8 micrograms per cubic meter ($\mu g/m^3$). The maximum increase occurs within the planning area. The annual average $PM_{2.5}$ increase of 1.1 $\mu g/m^3$ also occurs within the planning area. The average 24-hour average $PM_{2.5}$ increase attributable to RMP revision emissions is 0.01 $\mu g/m^3$ for Alternatives C and D.

Predicted $PM_{2.5}$ concentration differences between the two modeled emission data sets occur, but are small in magnitude. The modeling results indicate that at most the difference is 1.11 $\mu g/m^3$. The average difference is 0.005 $\mu g/m^3$ for the 24-hour average. With respect to the annual average, the maximum difference is 0.3 $\mu g/m^3$.

Calculated $PM_{2.5}$ DVs (both baseline and future DVs, or DVF) have the same format as the 24-hour or annual average NAAQS and can be compared directly to the NAAQS to assess compliance. The annual average $PM_{2.5}$ NAAQS is expected to be attained at seven of the 11 monitors in the 4-km domain for modeled emission data sets including cumulative emissions. The monitor closest to the planning area shows future DVs under the standard. The greatest DV for all monitors (17.15 $\mu g/m^3$) occurs at the Odessa-Hays Elementary School monitor in Odessa, Texas.

The 24-hour average $PM_{2.5}$ NAAQS is expected to be attained at nine of the 11 monitors in the 4-km domain for both modeled emission data sets including cumulative emissions. The monitor closest to the planning area shows future values under the standard. Predicted DVs for the Alternatives A and B and Alternatives C and D for all monitors have a DVF equal to that of the future year base case. The greatest DVF for all monitors (43.4 $\mu g/m^3$) occurs at the Odessa-Hays Elementary School monitor in Odessa, Texas.

To summarize, annual average and 24-hour average $PM_{2.5}$ impacts attributable to the RMP revision and cumulative emissions are not expected to cause or contribute to violations of the $PM_{2.5}$ NAAQS. The projected DVs for the two modeled emission data sets show no change from the No Action Alternative. In addition, modeled $PM_{2.5}$ impacts attributable to RMP revision emissions do not extend to any non-attainment areas when comparing future year modeling results with and without RMP revision emissions.

Far-Field Assessment of Air Quality Impacts

Far-field assessments of air quality impacts included assessments of NO_2, CO, PM_{10}, and SO_2, as well as assessments of AQRVs. Predicted criteria pollutant concentrations were compared with applicable NAAQS and with NMAAQS when the New Mexico standards are more stringent or have different averaging times than the NAAQS. Far-field modeling results were also compared to applicable PSD Class I or II increments. These comparisons to PSD increments were made to identify potential significance and do not represent a regulatory increment consumption analysis.

NO_2

Predicted 1-hour NO_2 concentrations at Class I and sensitive Class II areas are less than 50% of the NAAQS. Nearly all project impacts are in the planning area, with the maximum impact being approximately 13 $\mu g/m^3$. The future year No Action Alternative and both modeled emission data sets have nearly identical predicted 1-hour concentrations for grid cells in all Class I and sensitive Class II areas. The lack of variation between the alternatives and the future year base case indicates that project source impacts are relatively insignificant compared to other sources in the cumulative analysis.

The EPA has not set a NAAQS for the 24-hour average; however, New Mexico has set a standard. According to NMED guidance (NMED 2011), demonstration of compliance with the 1-hour standard is a demonstration of compliance with the 24-hour New Mexico standard. Because the project impacts are below the 1-hour standard, 24-hour compliance has been demonstrated.

Project annual NO_2 impacts at Class I and sensitive Class II areas are below the NAAQS. The maximum concentration in the 4-km domain occurs in only one grid cell in the Four Corners region of New Mexico. The project impacts are almost completely within the planning area with a maximum project impact of approximately 11 $\mu g/m^3$.

PM_{10}

All of the second highest 24-hour concentration values (including background) for the Class I and sensitive Class II areas are well below the NAAQS of 150 $\mu g/m^3$. In addition, the 24-hour concentration values from project sources are below 0.3 $\mu g/m^3$ for the Class 1 and sensitive Class II areas. The project impacts are almost completely within the planning area with a maximum project impact of approximately 4 $\mu g/m^3$. The maximum concentration occurs just to the south of Albuquerque. The future year No Action Alternative and both modeled emission data sets have nearly identical predicted 24-hour concentrations for grid cells in all Class I and sensitive Class II areas. This lack of variation indicates that project source impacts are relatively insignificant compared to other sources in the cumulative analysis.

SO_2

For all averaging times the future year No Action Alternative and both modeled emission data sets have nearly identical predicted 24-hour concentrations for grid cells in all Class I and sensitive Class II areas. The lack of variation between the No Action Alternative and the modeled emission data sets indicates that project source impacts are relatively insignificant compared to other sources in the cumulative analysis.

Maximum 1-hour SO_2 values are well below the standard for all Class I and sensitive Class II areas. Cumulative 1-hour SO_2 total concentrations greater than the NAAQS are predicted for each alternative at two areas near Amarillo, Texas, and at another area in the lower panhandle of Texas. The maximum predicted concentration is 16 times the 1-hour SO_2 standard. Project only impacts are less than 0.1 $\mu g/m^3$ for both modeled emission data sets.

Maximum 3-hour SO_2 project impacts are below the PSD increment for all Class I and sensitive Class II areas in New Mexico and Texas. The NMED does not provide background values for the 3-hour average; therefore, the impacts are not compared to the NAAQS.

Maximum 24-hour SO_2 project impacts are below the PSD increment for all Class I and sensitive Class II areas in New Mexico. The NMED does not provide background values for the 24-hour average; therefore, the impacts are not compared to the NMAAQS.

Maximum annual SO_2 project impacts are below the PSD increment for all Class I and sensitive Class II areas in New Mexico. The NMED does not provide background values for the annual average; therefore, the impacts are not compared to the NMAAQS.

CO

All 1- and 8-hour project impacts are well under the NAAQS and NMAAQS for CO.

Visibility

Visibility is affected by plume impairment (heterogeneous) or regional haze (homogeneous). Because potential air pollutant emission sources include many small sources spread over a large area, discrete visible plumes are not likely to impact distant sensitive areas. At this preliminary resource planning stage, the RFD emission sources in this analysis consist of sources that do not have a defined location. Regional haze is caused by fine particles and gases scattering and absorbing light.

For this modeling analysis, potential changes to regional haze were calculated in terms of the level of perceptible change in visibility when compared to background conditions. A 1.0-deciview (dv) change is considered potentially significant in mandatory federal PSD Class I areas A 1.0-dv change is defined as approximately a 10% change in the extinction coefficient (corresponding to a 2% to 5% change in contrast for a black target against a clear sky at the most optically sensitive distance from an observer), which is a small but noticeable change in haziness under most circumstances when viewing scenes in mandatory federal Class I areas.

The visibility screening analysis for this modeling analysis followed the recommendations in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report - Revised Guidelines (FLAG 2010). The absolute total number of days of significant visibility changes (greater than 0.5 delta-dv and greater than 1.0 delta-dv) calculated for base year 2008, base case 2017, and future RFD alternatives is 366 days (every day of a leap year). Therefore, to show relative impacts among the alternatives with respect to the base case emissions scenarios, the calculated delta-dv (change in visibility) was divided by 15 for each day before counting and reporting the number of days above the thresholds. This essentially equates to evaluating impacts for thresholds of 7.5 delta-dv and 15 delta-dv.

Table 4-129 provides a summary of the project-only contribution to visibility air quality impacts for each Class I area and sensitive Class II area based on a 1.0 delta-dv threshold (after dividing each day visibility change [delta-dv] by 15). The project-only day count values are determined by subtracting out the number of days of “significant” visibility changes associated with the future base case modeling scenario (contains all cumulative emissions except project emissions) from the number of days of “significant” visibility changes associated with each modeled emission data set.

Project visibility impact contributions associated with the projected future alternatives are minimal. As shown, there are a few instances where “significant” impacts are predicted to occur at Class I or sensitive Class II areas. The highest number of days associated with project emissions occurs at Muleshoe National Wildlife Refuge, which is just downwind (predominant direction) of projected project oil and gas development. Non-project cumulative emissions (No Action Alternative) visibility impacts are driving the overall visibility impacts. A refinement of the non-project cumulative emissions estimates would reduce the number of days of total visibility impacts that would be likely closer to matching actual base and future visibility impacts/baseline conditions.

Table 4-129. Visibility Impacts at Class I and Sensitive Class II Areas Associated with Project Emissions

Class I or Sensitive Class II Areas	Number of Days in Modeled Year (normalized)	
	Alternatives A & B (1.0 dv)	Alternatives C & D (1.0 dv)
Bandelier WA	0	0
Bosque del Apache	0	0
Carlsbad Caverns NP	0	0
Gila Wilderness	1	1
Guadalupe Mountains NP	0	0
Pecos WA	0	0
Salt Creek WA	0	1
San Pedro Parks WA	0	0
Wheeler Peak WA	0	0
White Mountain WA	0	0
Aztec Ruins NM	0	0
Bitter Lake NWR	0	0
Buffalo Lake NWR	0	0
Capulin Volcano NM	1	1
Chaco Culture NHP	0	0
El Malpais NM	1	1
Fort Davis NHS	0	0

Class I or Sensitive Class II Areas	Number of Days in Modeled Year (normalized)	
	Alternatives A & B (1.0 dv)	Alternatives C & D (1.0 dv)
Fort Union NM	0	0
Grulla NWR	1	1
Lake Meredith NRA	0	0
Las Vegas NWR	0	0
Muleshoe NWR	2	2
Petroglyph NM	0	0
Salinas Pueblo Missions NM	1	1
San Andres NWR	0	0
Sangre De Cristo CA	0	0
Sevilleta NWR	0	0
White Sands NM	1	1

NWR = National Wildlife Refuge; WA = Wilderness Area; NHS = National Historic Site; NP = National Park; NRA = National Recreation Area; NM = National Monument; CA = Conservation Area; NHP = National Historic Park.

Deposition

The maximum annual nitrogen and sulfur deposition rates were estimated for 1 year of CAMx model outputs using project and cumulative emissions. For disclosure purposes only, project impacts were compared to the National Park Service (NPS) screening deposition analysis thresholds (DATs), which are defined as 0.005 kilogram per hectare per year (kg/ha/yr) in the western United States for both nitrogen and sulfur. Project impacts were determined by subtracting the annual deposition for the future year base case from the alternative annual deposition value. A DAT is the additional amount of nitrogen or sulfur deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered to be insignificant. The DAT is a screening threshold that was developed primarily to assess impacts from a single stationary source. Modeling results showing deposition greater than a DAT do not indicate the need for mitigation.

Full cumulative modeling was performed as part of this analysis. Project and cumulative impacts were compared to the level of concern, which is defined by the NPS and the USFS as 3 kg/ha/yr for nitrogen and 5 kg/ha/yr for sulfur. Deposition rates that are below the level of concern are believed to cause no adverse impacts.

At all areas and for both modeled emission data sets, the nitrogen DAT is exceeded at all Class I and sensitive Class II areas. The maximum nitrogen deposition was predicted for Alternatives C and D. The predicted deposition from all project sources was a factor of 58 times the nitrogen DAT. For a large aggregate project that includes thousands of sources (such as oil and gas development in the planning area), deposition greater than the DAT is typical. The predicted impacts are not considered to be significant for the aggregate project sources.

The maximum total project deposition (including background deposition) was predicted for Alternatives C and D. Total project nitrogen deposition is less than the level of concern at all Class I and sensitive Class II areas.

At all areas and for both modeled emission data sets, the sulfur DAT is greater than the project impacts at all Class I and sensitive Class II areas. Project sulfur deposition is less than the level of concern at all Class I and sensitive Class II areas.

An analysis of potential changes to lake acid neutralizing capacity (ANC) was performed. Annual deposition fluxes of sulfur and nitrogen predicted by CAMx at sensitive lake receptors were used in conjunction with baseline ANC values to estimate the change in ANC. The USFS considers lake chemistry changes to be potentially significant if the screening methodology predicts decreases in ANC of more than the limit of acceptable change (LAC). A lake's LAC depends on its baseline ANC value. The LAC is 10% change in ANC for lakes with baseline ANC values greater than or equal to 25 microequivalents per liter (μeq/L and

no more than 1 μeq/L cumulative loss in ANC is acceptable for lakes with ANC baseline values less than 25 μeq/L (USFS 2012). For this analysis, all lakes have a baseline ANC value greater than 25 μeq/L. Consequently, a decrease of 10% in ANC at any of the lakes is considered to be a significant impact. For all lakes, the project impacts are less than 1% ANC change.

Mitigation Measures

The alternatives matrix in Chapter 2 describes mitigation measures for oil and gas development on BLM-administered lands.

In addition, a variety of multi-level regulatory processes exist to ensure that pollutant levels do not increase above identified thresholds and/or air quality criteria. Pre-construction permitting processes are required to consider cumulative impacts of proposed and surrounding future sources to ensure that proposed sources within the project area would not contribute to exceedances of the NAAQS.

4.2.11.9 Impacts of Special Designations on Air Quality

Air quality impacts from Special Designations are generally projected to result in localized incrementally positive effects on both short- and long-term air quality to the extent that surface disturbance from construction activities, new roads, and traffic would be reduced or eliminated within ACECs, RNAs, SMAs, WSRs, WSAs, and VRM. This air quality improvement would be related to the number of acres designated and the management decisions for each designation that would limit activity on the designated lands. Conversely, some of these designations may have the potential to increase traffic and surface disturbance in other areas depending on traffic patterns and route diversion around the designated areas. Due to the reduction in surface disturbance and re-entrained road dust from traffic, the greatest improvement would likely be a reduction of particulates in and near the designated areas.

Table 4-130. Summary of Acres Managed as ACECs and Percent Open to Leasable Mineral Development by Alternative - BLM Surface Lands Only

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acreage managed as ACECs	13,435	495,042	561,433	98,562	28,894
Total leasable – open	6,173	95,450	165,173	70,441	9,766
Percent of ACECs open	46%	19%	29%	71%	34%
Leasable – closed	7,262	399,592	396,260	28,120	19,127

Table 4-130 summarizes the acres managed as ACECs. The No Action Alternative has the least area managed as ACECs with about 46 percent of the total area open to leasable mineral development, while Alternative B has the greatest area managed as ACECs and open to leasable mineral development. Alternative A has the second most area managed as ACECs and open to development. Alternatives C and D fall between the No Action Alternative and Alternative A in terms of total managed area as well as area open to development. In terms of general magnitudes of impacts, Alternatives A and B would have similar impacts and would impact air quality the least because of the sizeable area managed and the magnitude of leasable area closed to minerals development. Similarly, Alternatives C and D would be expected to have a similar impact to air quality with Alternative C having less of an impact than Alternative D due to larger area managed and closed to minerals development. Both would be expected to have a much greater impact than Alternatives A and B. Within these groupings it is speculative to state which would have greater impacts to air quality because the area that would actually be developed under each alternative is unknown.

Impacts to air quality from managing areas as WSAs would have localized positive effects as noted above. Since the WSAs would be designated under all alternatives and would be closed to mineral development impacts would be the same under all alternatives. Managing an area as a WSR would also have localized positive effects because those areas would be managed as closed to development. Alternative A would have the greatest localized benefits as approximately 12 miles would be designated as WSRs. Alternatives B, C, and D would designate 3.67 miles. No river segments would be designated under the No Action Alternative; therefore, all of the action alternatives would provide for more positive effects to air quality than the No Action Alternative.

There would be no substantial positive or negative effects from alternatives decisions related to WSAs and WSRs due to the limited acreage that would be closed to disturbance under each category, 7,086 acres and 3.67 to 8.22 miles, respectively.

Impacts to air quality from VRM actions would have localized positive effects as noted above. Because VRM Class I and II severely constrain leasable mineral operations, these areas would impact air quality the least. All alternatives have comparable total acres with VRM decisions (Class I–IV), but Alternative B has the greatest acreage (357,803 acres) designated VRM Class I and II, followed by Alternative A (273,709 acres), Alternative C (67,963 acres), No Action (50,671 acres), and Alternative D (48,263 acres). Therefore, Alternative B would have the least air quality impact while the Alternative D would have the greatest air quality impact due to its limited acreage managed as VRM Class I and II.

4.2.11.10 Summary of Air Quality Impacts

The results of this analysis indicate that air quality impacts, while noticeable, are generally acceptable as compared to the indicators. Most predicted criteria pollutant concentrations are below the NAAQS throughout the extensive modeling domains included in this analysis. In a few cases and in limited locations, criteria pollutant concentrations are predicted to be greater than the NAAQS when assessing cumulative impacts, as shown in Table 4-131. Because of the many assumptions included in the analysis and the conservative nature of the modeling, these predictions may or may not indicate future exceedances of the NAAQS. Predictions of pollutant concentrations approaching or exceeding the NAAQS indicate the potential need for additional ambient monitoring data, refined modeling, and consideration of additional mitigation measures. As noted previously, both modeling scenarios contained emissions from 10,117 active BLM oil and gas wells and 20,379 non-BLM oil and gas wells. The maximum number of wells in the modeling analyses is much greater than the number of wells projected for the planning area (3,538 - 6,044 wells on BLM surface and subsurface administered lands and 9,600 wells on non-BLM-administered lands). Consequently, the modeling results should be considered conservatively high. As the air quality permitting agency, the NMED Air Quality Bureau (AQB) would closely track future air quality changes and require facility-specific modeling for high-emitting sources before issuing air quality permits.

Table 4-131. Summary of Far-Field Potential National Ambient Air Quality Standard Impacts

Pollutant	Averaging Time	No Action Alternative Impacts Above NAAQS/NMAAQS?	Potential Project Impacts Above NAAQS/NMAAQS?	Potential Cumulative Impacts Above NAAQS/NMAAQS?	Comments on Potential Cumulative Impacts
CO	1 hour	No	No	No	–
	8 hour	No	No	No	–
NO_2	1 hour	No	No	No	–
	Annual	No	No	No	–
Ozone	8 hour	Yes [a]	No [a]	Yes [a]	Ten of the 31 monitors in the 4-km domain have DVFs above the NAAQS for the No Action and all action alternatives (maximum 79 ppb in the Four Corners Area vs. 75 ppb standard).
PM_{10}	24 hour	No	No	No	–
$PM_{2.5}$	24 hour	Yes [a]	No [a]	Yes [a]	Two of the 11 monitors in the 4-km domain have DVFs above the NAAQS for the No Action and all action alternatives (maximum 43 µg/m^3 in Odessa, TX, vs. 35 µg/m^3 standard).
	Annual	Yes [a]	No [a]	Yes [a]	Four of the 11 monitors in the 4-km domain have DVFs above the NAAQS for the No Action and all action alternatives (maximum 17 µg/m^3 in Odessa, TX, vs. 12 µg/m^3 standard).
SO_2	1 hour	Yes	No	Yes	Potential impacts above the NAAQS may occur for all alternatives at some Class II receptors. Differences among alternatives are slight (maximum 16 times the 196 µg/m^3 standard in Amarillo, TX, for all alternatives).
	3 hour	No	No	No	–
	24 hour	No	No	No	–
	Annual	No	No	No	–

[a] Based on DVFs

Far-field potential AQRV impacts are summarized in Table 4-132 and described below. The nitrogen deposition results shown in the table represent Alternatives C and D. Predicted impacts for Alternatives A and B are lower. Results above the DAT are not considered significant, because of the large number of sources included in the modeling analysis. The sulfur deposition results shown in the table represent Alternatives A and B. Predicted impacts for Alternatives C and D are lower. The lake ANC results shown in the table represent Alternatives A and B. Predicted impacts for Alternatives C and D are lower.

Project visibility impact contributions associated with the projected future alternatives are minimal and are not considered to be significant. There are a few instances where "significant" impacts are predicted to occur at Class I or sensitive Class II areas. Non-project cumulative emissions (No Action Alternative) visibility impacts are driving the overall visibility impacts. A refinement of the non-project cumulative emissions estimates would reduce the number of days of total visibility impacts that would be likely closer to matching actual base and future visibility impacts/baseline conditions.

At all areas and for both modeled emission data sets, the nitrogen DAT is exceeded at all Class I and sensitive Class II areas. The DAT is a screening threshold that was developed primarily to assess impacts from a single stationary source. Modeling results showing deposition greater than a DAT do not indicate the need for mitigation. For a large aggregate project that includes thousands of sources (such as oil and gas development in the planning area), deposition greater than the DAT is typical. The predicted impacts are not considered to be significant for the aggregate project sources.

For the No Action Alternative and the cumulative analyses for the action alternatives, the ANC is above the LAC for all lakes. Project-only impacts are below the LAC.

Table 4-132. Summary of Far-Field Potential Air Quality Related Value Impacts

AQRV	No Action Alternative Impacts	Potential Project Impacts	Potential Cumulative Impacts
Visibility at Class I areas	366 days (leap year).	1 day above 1.0 dv at Gila Wilderness for Alternatives A, B, C, and D. 1 day above 1.0 dv at Salt Creek Wilderness for Alternatives C and D.	366 days.
Visibility at sensitive Class II areas	366 days.	1 or 2 days above 1.0 dv at 7 locations for Alternative A and B and 8 locations for Alternatives C and D.	366 days.
Nitrogen deposition	Above the DAT at all receptors by a factor of approximately 10,900). Above the LOC at all receptors by a factor of 18).	Above the DAT at most Class I and sensitive Class II areas (maximum impact 58 times the DAT for Alternatives C and D), but below the LOC at all receptors.	Above the DAT at all receptors by a factor of approximately 10,900). Above the LOC at all receptors by a factor of 18).
Sulfur deposition	Above the DAT at all receptors (maximum impact approximately 9,900 times the DAT). Above the LOC at most receptors (maximum impact approximately 16.5 times the LOC).	Below the DAT and LOC at all receptors.	Above the DAT at all receptors (maximum impact approximately 9,900 times the DAT). Above the LOC at most receptors (maximum impact approximately 16.5 times the LOC).
Lake ANC	Above the LAC for all lakes (maximum impact approximately 174 times the LAC).	Below the LAC for all lakes.	Above the LAC for all lakes (maximum impact approximately 174 times the LAC).

ANC = acid neutralizing capacity; LOC = level of concern; LAC = limit of acceptable change.

4.2.11.10.1 Emissions and Alternative Comparisons

Air quality impacts differed among the alternatives, with Alternatives C and D generally having the greatest air quality impacts when emissions from project sources were modeled. The Alternatives C and D modeled emission data set includes management actions required by state and federal "on the books" regulations. This modeled emission data set has greater emissions of pollutants than Alternatives A and B that include additional emissions controls applied to project oil and gas RFD sources.

4.2.11.10.2 Near-Field Results

With regard to criteria pollutants subject to NAAQS or NMAAQS, six pollutants were modeled. Near-field modeling predicted concentrations are below both NAAQS and NMAAQS for each non-ozone (and non-lead) criteria (state and national) pollutant and averaging time. HAP emissions were also modeled, though there is no ambient standard for these pollutants. Risks associated with six modeled HAPs were predicted to be less than RELs and RfCs. Cancer risk was estimated to be below one in one million for the MLE individual scenario.

4.2.11.10.3 Far-Field Criteria Pollutant Results

Far-field criteria pollutant modeling results are briefly summarized, as follows:

- Project impacts are predicted to be below the NAAQS for each modeled emission data set and at each modeled receptor for the following pollutants and averaging times:
  - Ozone (8-hour)
  - NO_2 (1-hour and annual)
  - PM_{10} (24-hour and annual)
  - $PM_{2.5}$ (24-hour and annual)
  - SO_2 (1-hour, 3-hour, 24-hour, and annual)
  - CO (1-hour and 8-hour)
- The No Action Alternative and cumulative impacts are predicted to be below the NAAQS for each modeled emission data set and at each modeled receptor for the following pollutants and averaging times:
  - PM_{10} (24-hour)
  - NO_2 (1-hour and annual)
  - SO_2 (3-hour, 24-hour, and annual)
  - CO (1-hour and 8-hour)
- Cumulative 8-hour ozone total concentrations greater than the NAAQS are predicted for each modeled emission data set at approximately one-third of the monitors in the 4-km domain. The majority of the monitors lie in the El Paso, Texas, area. The projected DVs for the two modeled emission data sets show little to no change from the No Action Alternative.
- Cumulative 1-hour SO_2 total concentrations greater than the NAAQS are predicted for each modeled emission data set at two areas near Amarillo and at another area in the lower panhandle of Texas. Project only impacts are less than 0.1 $\mu g/m^3$ for both modeled emission data sets.
- Cumulative 24-hour and annual $PM_{2.5}$ total concentrations greater than the NAAQS are predicted for each modeled emission data set at a few monitors not in the planning area. In each case, the results for the modeled emission data sets are the same as those for the No Action Alternative.

4.2.11.10.4 AQRV Results

AQRV assessments led to the following conclusions:

- **Visibility** – Visibility impacts were assessed in terms of the number of days in which visibility changes may equal or exceed a 0.5-dv (single source) or 1.0-dv (multiple sources) change from estimated natural visibility conditions.
  - The absolute total number of days of significant visibility changes (greater than 0.5 delta-dv and greater than 1.0 delta-dv) for base year 2008, No Action Alternative 2017, and future RFD alternatives is 366 days (every day of the year). Therefore, to show relative impacts among the alternatives with respect to the base case emissions scenarios, the calculated

delta-dv (change in visibility) was divided by 15 for each day before counting and reporting the number of days above the thresholds. Baseline conditions were subtracted from alternatives impacts to determine project contributions, and there are only several instances where "significant" project-related impacts are predicted to occur at Class I or sensitive Class II areas. The highest number of days (2) associated with project emissions occurs at Muleshoe National Wildlife Refuge, which is just downwind (predominant direction) of projected project oil and gas development.

- **Deposition** – Project sulfur and nitrogen deposition are below the level of concern at all modeled Class I and sensitive Class II areas. Nitrogen impacts for the No Action Alternative and cumulative impacts are above the level of concern at all receptors. Sulfur deposition impacts for the No Action Alternative and cumulative impacts are above the level of concern at most receptors.
- **Lake Chemistry** – At the five modeled sensitive lakes, ANC changes due to project emissions are predicted to be less than 1%. The greatest ANC changes are predicted to occur at Upper Truchas Lake. ANC changes attributable to the No Action Alternative and cumulative impacts for the action alternatives are above the LAC for all lakes.

4.2.11.10.5 Climate Change Analysis

Research on how emissions of GHGs influence global climate change and associated effects has focused on the overall impact of emissions from regional or global aggregate sources. This approach is required primarily because GHG emissions from single sources are small relative to aggregate emissions and GHGs, once emitted from a given source, become well mixed in the global atmosphere and have a long atmospheric lifetime (EPA 2008). The climate change research community has not yet developed tools specifically intended for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source. The current tools for simulating climate change generally focus on global- and regional-scale modeling. Global- and regional-scale models lack the capability to represent many important small-scale processes. As a result, confidence in regional- and sub-regional-scale projections is lower than at the global scale. Therefore, limited scientific capability exists to assess, detect, or measure the relationship between emissions of GHGs from a specific single source and any localized impacts.

Climate change analyses are composed of several factors, including GHGs, land use management practices, and the albedo effect (i.e., how much of the sun's energy is reflected off the surface of the earth). While it is possible in many cases to quantify potential quantities of GHG emissions or the amount of carbon sequestered from particular activities, the tools necessary to quantify the incremental climatic impacts of those specific activities are presently unavailable. While there are difficulties in attributing specific climate change impacts to any given project or activity and quantifying those impacts, projected GHG emissions can serve as a proxy for a proposed action's climate change impacts.

Table 4-133 provides maximum annual planning area RMP revision (i.e., project) GHG emissions for each alternative and each of the three estimated GHGs, as well as carbon dioxide equivalent (CO_2e) emissions in metric tons per year (mtpy) for year 2028. GHG emissions calculated for this analysis include GHGs that would be emitted from oil and gas equipment (combustion sources and equipment leaks), gas venting, and motor vehicle emissions.

In Table 4-133, planning area RMP revision GHG emissions are compared to statewide annual 2007 New Mexico emissions. Annual estimated 2007 New Mexico GHG emissions were 76.2 million metric tons of CO_2e. There is little difference in CO_2e emissions among the alternatives, with Alternatives A and B producing slightly higher CO_2e emissions. Maximum GHG emissions are estimated to be approximately 17% of 2007 New Mexico GHG emissions. The maximum estimated GHG emissions are approximately 0.2% of total U.S. 2008 CO_2e emissions of 6,821E+06 mtpy.

Table 4-133. 2028 GHG Emissions as Percentage of New Mexico Annual Inventory

Alternative	Emissions (mtpy)			CO_2e Emissions (10^6 mtpy)	Percentage of New Mexico Inventory
	CO_2	CH_4	N_2O		
Alternatives A and B	11,547,017	46,191	208	13	17%
Alternatives C and D	11,512,402	13,235	208	12	16%

Note: The ARTSD does not include GHG emissions for the No Action Alternative.
CO_2 = carbon dioxide; CH_4 = methane; N_2O = nitrous oxide.

GHG emissions are also produced from livestock grazing which is expected to create 58,480 mtpy CO_2e produced from enteric fermentation and manure management within the planning area under the No Action Alternative based on CFO current allotment categorization. This represents less than 0.1% of the New Mexico inventory. Because there is not typically any planting or cultivation associated with livestock grazing in the area, other potential GHG associated with these activities are not included in the livestock grazing emissions estimate. Because Alternatives A and B have less acreage open to livestock grazing, impacts are expected to be less than the No Action Alternative as shown in Table 4-134. Alternatives C and D have similar acreage open to livestock grazing as the No Action Alternative, with Alternative D being slightly higher, as such, impacts are expected to be similar, with Alternative D expected to be slightly higher.

Table 4-134. GHG Emissions from Enteric Fermentation and Manure Management (CO2e emissions mtpy)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
58,480	44,803	54,321	58,400	58,526

Oil and gas operations are subject to a multitude of state and federal regulations that would help mitigate the effects of the activities. State permitting requirements as well as most federal NSPS and NESHAP are primarily established to reduce regulated criteria pollutants and hazardous air pollutants. However, many of these regulations would have the added benefit of reducing GHG emissions by capturing and recycling waste streams where possible, limiting the allowable uncontrolled vented emissions, combusting waste streams, and reducing fugitive emissions.

Climate change is affecting the southwest United States with temperature increases of almost 2°F in the last century and further increases of 3.5°F to 9.5°F anticipated by the end of this century. Drought conditions are already common in the Southwest and drought periods are expected to become more frequent, intense, and longer. Drought will affect important water sources, including the Colorado River Basin. Combined with expected population growth, climate change will exacerbate existing stresses (EPA 2016a). Preparing for and adapting to these changes will be a challenge moving forward. Climate change researchers and policy makers have not yet spelled out how to adapt to climate change with ground-level action; however, natural resource mismanagement contributes to the vulnerability of human systems to these hazards, and enhanced management can provide a tool for vulnerability reduction. (EPA 2016a). GHG emitting sources within the planning area would affect the resources ability to adapt to climate change by utilizing land that would otherwise be left in a natural state and utilizing diminishing resources such as water. Management of the GHG emitting sources within the planning area would facilitate vulnerability reduction.

Cumulative and Planning Area Specific End-Use GHG CO2e Emissions

Upstream (wellhead) and midstream (booster station or processing plant) GHG emissions for projected oil and gas development / production are readily estimated using common GHG emissions factors (40 CFR Part 98, American Petroleum Institute [API], non-roads emissions model, etc.) along with equipment and emissions source information directly related to the new oil and gas development. Production project. Downstream / end-use GHG emissions are usually not calculated for a particular subset of the cumulative / total oil and gas production (i.e., for a field office / planning area oil and gas Reasonable Foreseeable Development [RFD] scenario) but these downstream emissions are directly related to end-use energy consumption. Downstream emissions refer to the refining of petroleum crude oil and the processing and purifying of raw natural gas. It also includes the marketing and distribution of products derived from crude oil and natural gas. End use refers to the consumption of those end products in various sectors such as

residential, commercial, industrial, and transportation. The challenge for estimating these downstream emissions comes with understanding how the oil and gas will ultimately be distributed and used for energy. Because this information is not typically available during the planning stage, an alternate method of end use emissions estimation based on production data was developed (BLM 2017).

To estimate the ultimate end-use/energy consumption emissions for a particular field office planning area the baseline and projected annual oil and gas production values must be estimated and then multiplied by appropriate emission factors to calculate CO2e emissions.

Historical annual oil and gas production volumes were obtained from the Office of Natural Resources Revenue for Federal mineral estate in the planning area (ONRR 2016) and were used as the basis for projecting the total production of oil and gas in the CFO. It is believed that 2 percent growth per year for hydrocarbon production represents a reasonable National average growth that takes into consideration periods of high and low drilling activity. There are factors, such as the number of drilling rigs and maximum permit processing rates that can limit the amount of growth in production. The 2 percent national growth rate is also supported by the U.S. Energy Information Administration which projected a 1-2 percent growth rate for hydrocarbon production in the U.S. (http://www.eia.gov/outlooks/aeo/). The ONRR data for the planning area from 2010 to 2015, however, reflects a 10% growth rate. Utilizing a 2% to 10% range thus depicts the potential hydrocarbon production for the CFO, based on the national projection and the historical growth in the planning area.

For comparison, natural gas and crude oil production data by state and for the U.S. were obtained from the U.S. Energy Information Administration (EIA 2016). Projections for oil and gas production are based on a 2 percent annual growth for New Mexico and the rest of the United States. Historical and projected production are shown in table 4-134.

The primary GHGs associated with the oil and gas industry are carbon dioxide (CO2) and methane (CH4) and, to a lesser extent, nitrous oxide (N2O). Because methane has a global warming potential that is 25 times greater than the warming potential of CO2, and nitrous oxide has a global warming potential that is 298 times greater than the warming potential of CO2, the EPA uses measures of CO2 equivalent (CO2e) which takes the difference in warming potential into account for reporting greenhouse gas emissions.

Emissions are expressed in metric tons of CO2 equivalent in this analysis. CO2e emissions are based on emission factors generated for CO2 (BLM 2017), CH4 and N2O (CFR 2013). Table 4-135 shows the indirect production of oil and gas and Table 4.-136 shows the associated CO2e emissions assuming that the products are ultimately combusted.

The data show that for a 2% growth rate the CFO federal wells account for about 35 percent of the end use emissions resulting from the state of New Mexico oil and gas production. Likewise, the CFO federal wells account for about 1.4 percent of the end use emissions resulting from U.S. oil and gas production. It would be speculative to assume where these emissions would occur as products could be distributed regionally, across the U.S. or be transported internationally. These estimates are based on expected oil and gas growth but indicate that end use emissions generated from products extracted from the CFO federal wells are significant compared to New Mexico oil and gas contributions as a whole.

If production continues to rise at a 10% growth rate for CFO oil and gas production over the next 20 years the total production would be 17.7 Billion MCF of gas and 4.62 Billion BBLS of oil. This would result in the end use emissions increasing to 971 Million Metric Tons CO2e for gas and 1.99 Billion Metric Tons CO2e for oil, for a total of 2.96 Billion Metric Tons CO2e. The CFO production would account for 3.6 % of the end use emissions of all U.S. production.

Table 4-135. Estimated Indirect Production from Oil and Gas by Geographic Area

Geographic Area→		CFO Federal Wells [6]		All New Mexico		United States	
	Year	Gas SE NM (MCF)	Oil for SE NM (BBLS)	Total Gas for All NM (MCF) [4]	Total Oil for All NM (BBLS) [5]	Total Gas for US (MCF) [4]	Total Oil for US (BBLS) [5]
	2006	2.28E+08	2.25E+07	1.62E+09	5.95E+07	2.35E+10	1.86E+09
	2007	2.19E+08	2.34E+07	1.56E+09	5.92E+07	2.47E+10	1.85E+09
	2008	2.04E+08	2.38E+07	1.49E+09	6.02E+07	2.56E+10	1.83E+09
	2009	1.92E+08	2.63E+07	1.43E+09	6.12E+07	2.61E+10	1.95E+09
	2010	1.87E+08	2.92E+07	1.34E+09	6.55E+07	2.68E+10	2.00E+09
	2011	1.83E+08	3.33E+07	1.29E+09	7.15E+07	2.85E+10	2.06E+09
	2012	1.98E+08	4.20E+07	1.28E+09	8.55E+07	2.95E+10	2.37E+09
	2013	2.18E+08	4.98E+07	1.25E+09	1.02E+08	2.95E+10	2.73E+09
	2014	2.46E+08	6.20E+07	1.27E+09	1.24E+08	3.14E+10	3.20E+09
	2015*	2.82E+08	7.33E+07	1.30E+09	1.47E+08	3.29E+10	3.44E+09
1	2016	2.87E+08	7.48E+07	1.32E+09	1.50E+08	3.36E+10	3.51E+09
10	2025	3.43E+08	8.94E+07	1.58E+09	1.79E+08	4.01E+10	4.19E+09
20	2035	4.19E+08	1.09E+08	1.93E+09	2.18E+08	4.89E+10	5.11E+09
Total (20 year)		***6.98E+09***	***1.82E+09***	***3.21E+10***	***3.64E+09***	***8.15E+11***	***8.52E+10***

*Used for 20-year projections

Table 4-136. Projected Estimated Indirect CO2e Emissions from End Use of Oil and Gas by Geographic Area

Geographic Area→		CFO Federal wells		All New Mexico		United States	
	Year	Gas (Metric Tons CO2e)	Oil (Metric Tons CO2e)	Gas (Metric Tons CO2e)	Oil (Metric Tons CO2e)	Gas (Metric Tons CO2e)	Oil (Metric Tons CO2e)
	2006	1.25E+07	9.69E+06	8.87E+07	2.56E+07	1.29E+09	7.98E+08
	2007	1.20E+07	1.00E+07	8.52E+07	2.54E+07	1.35E+09	7.97E+08
	2008	1.12E+07	1.02E+07	8.15E+07	2.59E+07	1.40E+09	7.87E+08
	2009	1.05E+07	1.13E+07	7.81E+07	2.63E+07	1.43E+09	8.40E+08
	2010	1.02E+07	1.25E+07	7.35E+07	2.82E+07	1.47E+09	8.59E+08
	2011	1.00E+07	1.43E+07	7.05E+07	3.07E+07	1.56E+09	8.86E+08
	2012	1.08E+07	1.81E+07	6.99E+07	3.68E+07	1.62E+09	1.02E+09
	2013	1.19E+07	2.14E+07	6.83E+07	4.38E+07	1.62E+09	1.17E+09
	2014	1.34E+07	2.67E+07	6.94E+07	5.32E+07	1.72E+09	1.38E+09
	2015*	1.54E+07	3.15E+07	7.10E+07	6.31E+07	1.80E+09	1.48E+09
1	2016	1.57E+07	3.22E+07	7.24E+07	6.44E+07	1.84E+09	1.51E+09
10	2025	1.88E+07	3.84E+07	8.66E+07	7.69E+07	2.20E+09	1.80E+09
20	2035	2.29E+07	4.69E+07	1.06E+08	9.38E+07	2.68E+09	2.20E+09
Total (20 year)		***3.82E+08***	***7.82E+08***	***1.76E+09***	***1.56E+09***	***4.47E+10***	***3.66E+10***
Total (20-year gas + oil)		**–**	***1.16E+09***	**–**	***3.32E+09***	**–**	***8.13E+10***
CFO Federal Wells/ Each Group Total		**–**	**–**	**–**	***35.0%***	**–**	***1.4%***

Unavoidable Adverse Impacts

Unavoidable adverse impacts to air resources as a result of oil and gas development and other emission sources in the planning area under the No Action Alternative and any of the four action alternatives would consist of increases in concentrations of criteria pollutants and HAPs. As a consequence of increased concentrations of criteria pollutants, some degradation in AQRVs would occur. The number of days with visibility impacts greater than or equal to 1.0 dv was one or two at eight of the Class 1 and sensitive Class II areas. Calculated nitrogen impacts exceeded the DAT but were below the level of concern (LOC) at the Class I and sensitive Class II areas. Calculated nitrogen impacts were below the DAT and LOC at the Class I and sensitive Class II areas. Lake ANC changes were below the LAC at the five lakes in the study area. Although concentrations would increase under the alternatives modeled, values show compliance with all the NAAQS for project sources.

Short-Term Use Versus Long-term Productivity

Development of the oil and gas resources may result in short- and long-term degradation of air quality. The short-term use of the tract for mining operations would result in impacts to air resources in the analysis area for the duration of the oil and gas operations. Upon cessation of operations these impacts would be eliminated and would not impact the long-term productivity of the air resource.

Irreversible and Irretrievable Commitments of Resource

The irreversible commitment of a resource means that, once committed, the resource is permanently lost to other uses. This type of commitment generally applies to nonrenewable resources (e.g., minerals, geologic features, or cultural resources) or to resources that are only renewable over a very long period of time (e.g., soil productivity or perhaps old-growth forest.). Irretrievable commitments of resources, on the other hand, are not regained following cessation of the activity and reclamation. There would be no irreversible commitments of air resources as a result of oil and gas operations. All air resource impacts described would be retrievable, because air quality would cease to be impacted by oil and gas operations following cessation of activities.

4.2.11.11 Impacts of Renewable Energy Actions on Air Quality

Air quality impacts from renewable energy management actions are generally projected to result in negligible to incrementally positive effects on both short- and long-term air quality to the extent that fossil fuel combustion emissions are reduced. Short term air quality impacts from construction emissions would depend on the level of development and land disturbance that occurs under each alternative.

Renewable energy actions' effect on climate change, while difficult to quantify, is generally expected to have a positive impact by helping to reduce GHG emissions from fossil fuels. However, land disturbance associated with renewable energy projects may have a negative impact on the resources' ability to adapt to climate change by reducing natural buffer systems.

Under the No Action Alternative, 964,322 acres would be open for geothermal development, 271,316 acres would be open for solar development, and 1,134,948 acres would be open for wind development on BLM-administered lands. The geothermal and solar development under the No Action Alternative is significantly less than any of the action alternatives as 59% to 82% of the land would be open to geothermal and solar in the action alternatives with Alternative D providing the most acreage open to geothermal and solar development. The area open to wind development ranges from 36% to 52% of the area open in the action alternatives. While a direct correlation cannot be made between acres available for renewables to reductions in fossil fuel combustion, the No Action Alternative provides the least opportunity to develop renewable energy, and, therefore, may have the least air quality benefit. Because the Action Alternatives have comparable area open to renewables development, the air quality impact is expected to be similar in magnitude among each of the Action Alternatives, although Alternative D would provide the most opportunity to develop renewable energy.

4.2.11.12 Impacts of Livestock Grazing Actions on Air Quality

Livestock grazing actions are generally projected to result in localized air quality impacts and would depend on the level of grazing (bare soils subject to wind erosion) and the number of animals grazed (methane emissions). To the extent that this land is unavailable for other uses such as minerals development and industry, more land reserved for grazing may result in an incremental positive effect on air quality, however, this would be dependent on the number of animals grazed per acre and potential alternate land uses.

Common management actions such as control of land utilization levels, erosion control, and livestock grazing standards would generally have a positive impact on air quality. Minimal impact to air quality is expected from locating livestock outside of archaeological districts.

The No Action Alternative opens the largest area to grazing, whereas, the Action Alternatives would allow slightly less grazing on BLM-administered lands. Because alternate land uses and animals grazed per acre are ill defined, the impacts to air quality would be speculative; however, there are no appreciable differences in the areas open to grazing among the alternatives so there impacts are expected to be similar.

Refer to Section 4.2.11.10.5 for a discussion of livestock emissions and adaptation to climate change.

4.2.11.13 Impacts of Travel and Transportation Management Actions on Air Quality

4.2.11.13.1 Impacts from Management Common to All

Phantom Banks Heronries, motorized wheeled cross-country travel limitations, and emergency OHV limitations would have a positive impact on air quality because these measures effectively reduce traffic in designated areas. Because these areas would likely be dirt roads, the greatest improvement would be in particulate emissions.

4.2.11.13.2 Impacts from Management Common to All Action Alternatives

Management actions common to all action alternatives are not expected to significantly impact air quality.

4.2.11.13.3 Impacts from the No Action Alternative

Under the No Action Alternative, 2,035,307 acres would be OHV limited and 55,966 acres would be closed to vehicle travel. Air quality impacts would be dependent on the number and types of vehicles and the types of travel surfaces used by the vehicles. All of the action alternatives are similar in magnitude to the No Action Alternative with a progressive decrease in area closed to vehicle travel from Alternative A down to Alternative D, which represents 74% of the No Action Alternative. While a direct correlation cannot be made to air quality impact, Alternative D would likely have the greatest impact on air quality because it has the least area closed to vehicle travel and the No Action Alternative would likely have the least impact on air quality because it provides the greatest area closed to travel.

4.2.11.13.4 Impacts from Alternative A

Under the Alternative A, 2,039,299 acres would be OHV limited and 52,028 acres would be closed to vehicle travel. Alternative A is the second most restrictive for areas closed to travel. Effects to air quality are dependent on actual road development and vehicle miles traveled but would be expected to be improved as compared to the No Action Alternative.

4.2.11.13.5 Impacts from Alternative B

Under the Alternative B, 2,049,391 acres would be OHV limited and 41,936 acres would be closed to vehicle travel. Effects to air quality are expected to be similar to No Action and Alternative A although there is decrease in areas closed to travel which may be more detrimental to air quality.

4.2.11.13.6 Impacts from Alternative C

Under the Alternative C, 2,052,582 acres would be OHV limited and 38,738 acres would be closed to vehicle travel. Effects to air quality are expected to slightly greater than No Action and Alternatives A and B due to a decrease in areas closed to travel, which may be detrimental to air quality.

4.2.11.13.7 Impacts from Alternative D

Under the Alternative D, 2,052,584 acres would be OHV limited and 38,737 acres would be closed to vehicle travel. Alternative D is the least restrictive in areas closed to travel and therefore would likely be the most detrimental to air quality.

4.2.11.14 Summary of Direct and Indirect Impacts

Both modeling scenarios for evaluation of mineral actions on air quality contained emissions from 10,117 active BLM oil and gas wells and 20,379 non-BLM oil and gas wells. The maximum number of wells in the modeling analyses is much greater than the number of wells projected for the planning area (3,538–6,044 wells on BLM0-administered lands and 9,600 wells on non-BLM-administered-lands). The numbers of wells used in the analyses are almost two times the number of wells projected for the planning area. Consequently, the modeling results are considered conservatively high.

It is difficult to quantify air quality impacts from management actions for the other resource areas. Although there are some specific data for some of the resource areas, the available data do not allow emissions to be calculated for the different alternatives. Many of the resource areas have proposed management and travel-related decisions that limit or reduce surface and vegetation disturbance, increase vegetation and habitats, limit or reduce OHV and other off-trail access, and improve existing roadway and trail surfaces. However, no specific data have been developed to quantify the level of impact from the management actions. In addition, not all of the potential emission sources were included in the modeling analyses.

Because of the level of conservatism contained in the air quality modeling (number of wells), the potential air quality benefits of reducing the number of wells in the analysis to the numbers projected for the planning, are greater than the potential air quality benefits of management actions for the other resource areas.

Table 4-131 summarizes the impacts to air quality from management actions for each resource in the planning area. Table 4-132 summarizes the direct impacts to air quality from mineral actions.

In Table 4-133, project visibility impact contributions associated with the projected future alternatives are minimal. There are a few instances where “significant” impacts are predicted to occur at Class I or sensitive Class II areas. Non-project cumulative emissions (No Action Alternative) visibility impacts are driving the overall visibility impacts. A refinement of the non-project cumulative emissions estimates would reduce the number of days of total visibility impacts that would be likely closer to matching actual base and future visibility impacts/baseline conditions.

For both modeled emission data sets, the nitrogen DAT is exceeded at all Class I and sensitive Class II areas. The DAT is a screening threshold that was developed primarily to assess impacts from a single stationary source. For a large aggregate project that includes thousands of sources (such as oil and gas development in the planning area), deposition greater than the DAT is typical. Modeling results showing deposition greater than a DAT do not indicate the need for mitigation. The predicted impacts are not considered to be significant for the aggregate project sources.

4.3 RESOURCE USES

4.3.1 Minerals

This section presents the environmental consequences of resource management decisions proposed under each of the five alternatives described in Chapter 2 - Alternatives upon leasable, locatable, and salable mineral resource development. Existing conditions concerning minerals including the RFD are described in Section 3.3.1. In accordance with BLM policy and its recognition of the national Energy Policy and Conservation Act of 2000, as discussed in Chapters 2 and 3, mineral resource development would be allowed throughout the CFO planning area subject to standard lease terms unless precluded by other program prescriptions, as specified in this RMP/EIS.

As explained in detail in Chapter 3, the Permian Basin began producing oil and gas in 1924 and has produced continuously since (Engler et al. 2012:1). Mineral activity is high in the planning area as demonstrated by the fact that the majority of the federal mineral estate managed by the CFO is currently leased. This trend is not expected to change in the 20-year planning horizon, as millions of barrels of oil and billions of cubic feet of gas still remain in the existing fields, and new oil and gas plays are explored each day.

Given this history and projections for future mineral development in the planning area, it is important to note that the CFO has been managing this heavy mineral development and other resources in the planning area following FLPMA's multiple-use mandate. This balancing act is facilitated by the application of management actions, including constraints placed on mineral development at the project implementation level to protect and conserve other public resources, such as recreation, special status species, and cultural resources. The existing RMP was written in 1988 and contains COAs, stipulations, and BMPs necessary to meet the multiple-use mandate. Since that time, two RMP amendments (1997 and 2008) have modified and added to the list of COAs, stipulations, and BMPs used by the CFO. All the while, mineral development in the planning area has continued, as represented by the trends described in Chapter 3 and the RFD scenario. This understanding is the foundation of the impacts analysis presented in this section.

Under the alternatives described in this RMP/EIS, the CFO would continue to require mineral developers to conduct operations in a manner that would minimize adverse impacts to other resources, land uses, and land users in accordance with laws, regulations, orders, and other constraints. These constraints could lead to increase costs and time required to fully development leasable minerals and could influence an operator's investment decision to conduct exploration. In many cases, these would be considered typical costs of doing business on public lands and would not result in a change in the long-standing trend of heavy mineral development in the planning area.

Impacts to mineral resource development were developed based on 1) professional experience from BLM mineral resource specialists, 2) the existing mineral development trends established for the planning area, and 3) knowledge of the existing trends for mineral development in light of the existing constraints placed on mineral development necessary to maintain BLM's multiple-use mission.

4.3.1.1 Leasable Minerals

4.3.1.1.1 Analysis Methods

Indicators

Land management planning decisions may have a direct impact on and result in an increase or reduction of lands available for leasing, the number of productive wells, and the number of producing operations depending on the alternative.

The amount of constraint on mineral leasing in a particular area can vary widely, depending on the need to mitigate impacts to other resources or uses in that area. An area may be closed to mineral leasing entirely if other resources or uses cannot be adequately protected from leasable mineral development with even the most restrictive lease stipulations. This would render any leasable mineral deposit in that area inaccessible for the life of the plan subject to valid existing rights. In contrast, an area with few resource or use conflicts may be open to mineral leasing subject to existing laws, regulations, and formal orders and the terms and conditions of the standard lease form. Between these two endpoints lay various degrees of other constraints where such restrictions may be required to mitigate impacts to other resource values. These restrictions may include seasonal and CSU restrictions (moderate constraints) or NSO (major constraints). Management for other resources within the planning area can also affect leasable mineral exploration and development. In general, management direction can either prohibit mineral exploration and development altogether or restrict leasable mineral exploration and development, which adds cost and delay, increases the complexity of the permitting process, and impacts the logistical operation of these exploration and development activities.

The impact indicators used in this analysis to measure the impacts of management decisions on oil and natural gas and geothermal resources development are:

- Acres of BLM-administered lands available for leasing fluid minerals, including oil and natural gas and geothermal resources;
  - Open under standard terms and conditions,
  - Open with moderate constraints (either CSU or timing limitation stipulations),
  - Open with major constraints (either NSO or overlapping CSU/timing limitation), or
  - Closed to leasing.
- Number of productive oil and natural gas (gas) wells to be impacted based on the RFD scenario for the planning area (Engler and Cather 2014); and
- Number of geothermal resource operations impacted.

Note that productive oil and gas wells are used instead of the total number of wells drilled because productive wells are the only ones that tap the resource. An increase or reduction in productive wells leads to an increase or decrease in royalties and depletion of the resource. Dry holes only have an impact on the drilling economy, so they are not used as an indicator for impacts on oil and gas development.

The impact indicators used to measure the impacts of management decisions on solid leasable mineral development are:

- Acres of BLM-administered lands available for leasing for potassium;
- Number of potassium mines predicted to be opened;
- Acres of BLM-administered lands available for leasing of sodium;
- Number of sodium mines predicted to be opened; and
- Acres of BLM-administered lands available for leasing of sulfur.

Methods and Assumptions

This section describes the methods and assumptions used for the analyses, discusses the availability of data, and identifies management decisions described in detail in Chapter 2 that would have very minor, if any, impacts to mineral resources.

As described in Chapter 3, extensive deposits of fluid leasable (oil, natural gas, and geothermal) and solid leasable (potassium, sodium, and sulfur) minerals occur in the planning area. These deposits have value to society if they can be economically produced. Management actions that temporarily prohibit or restrict development of these deposits may have a long-term beneficial effect on the resource in the ground because that resource would be available for development at a later date. However, current laws encourage and facilitate the development by private industry of public land mineral resources in a manner that satisfies societal needs and provides for economical and environmentally sound exploration, extraction, and reclamation practices.

Methods

The baseline used to determine potential impacts is the existing conditions as described in Chapter 3. Analysis assumptions were developed below to help guide the determination of impacts. The analyses described in this chapter represent the best estimates of impacts because exact locations of development or management often are not known. The magnitudes of effects are quantified to the extent practical based on available data. Effects are sometimes described using ranges of potential impacts. Qualitative descriptions of the nature of the impacts are also provided.

Management actions to protect other resource values could directly and indirectly impact new mineral leases, exploration, and development. A direct impact is one that specifically prohibits or allows leasing, exploration, or development. An example of a direct impact is the decision to identify areas as administratively unavailable or closed to new leasing. Management actions that do not explicitly allow or prohibit mineral exploration and development activity, but could influence a company's decision whether to proceed with a given project, are considered indirect impacts to leasing, exploration, or development. Effects can vary from beneficial to adverse. Effects include anything that would enhance or restrict leasing, exploration, and development. Adverse effects restrict leasable mineral development, and beneficial effects enhance leasable mineral development.

Fluid Leasables

The number of oil and gas wells affected is used to quantify the impacts from a number of decisions. The number of projected wells during the planning period was estimated from the projections in the RFD scenario (Engler and Cather 2014). The RFD scenario projected that 780 new completions per year would occur during the next 20 years in the planning area, with 62% (480) on non-federal land and 38% (300) on federal land. Thus, 9,600 wells are projected for non-federal land and 6,400 wells are projected to be drilled on federal land in the next 20 years. Of the predicted wells on non-federal land, 2,104 wells are projected to be drilled on split estate lands, where the federal government owns the mineral estate and the surface estate is owned by another entity. The concept of split estate lands is discussed in more detail in Section 3.3.1.1.1. Oil and gas wells on federal land would be drilled in the low, moderate, and high potential oil and gas areas as shown on Map 3-22.

Each land use plan decision is analyzed for its impact on fluid leasable mineral development, as measured by lands available for leasing for both oil and gas and geothermal resources, the numbers of oil and gas wells affected, and numbers of oil and gas producing operations affected. The total predicted number of wells on BLM-administered surface lands (6,400) and BLM-administered subsurface estate (2,104) was used as the baseline to calculate the impacts to fluid leasable minerals, by alternative. The analysis assumes that the percentage of land affected by a specific decision is directly proportional to the amount of resource affected by that decision. For example, if a decision would affect 10% of the BLM-administered surface lands available to leasable mineral development, then it would affect 10% of the mineral resources on that land and 10% of the wells that would be used to develop that resource (i.e., 10% of 6,400 wells or 640 wells over 20 years). Additionally, if a decision would affect 10% of the BLM-administered subsurface estate available to leasable mineral development, then it would affect 10% of the wells that would be used to develop that resource (i.e., 10% of 2,104 wells or 210 wells over 20 years). Reductions in the number of well locations (and potential surface disturbance) from the baseline RFD scenario for each alternative are a result of proposed management actions presented in Chapter 2, which can affect oil and gas or geothermal development activities by not allowing leasing, restricting surface occupancy, or controlling surface use.

Solid Leasables

Only the solid leasable minerals potassium and sodium occur in the planning area in deposits of sufficient quantity and quality to be considered commercial. Modest expansion is expected to occur for both potassium and sodium over the next 20 years. No commercial deposits of sulfur are known to occur in the planning area, nor are any expected to be found in the reasonably foreseeable future. However, sporadic exploration for sulfur would likely occur over the next 20 years.

Exploration, leasing, and development activity for solid leasables was estimated for the entire planning period. Projected exploration and development activity is based on staff experience and historical data outlined in Chapter 3 for potassium, sodium, and sulfur.

Assumptions

Fluid Leasables

The analysis began with the baseline total unconstrained oil and gas development potential taken from the RFD scenario for oil and gas (Engler et al. 2012) and applied the constraints from the other resource programs that may affect oil and gas development. All wells drilled are assumed to be productive wells, as the incidence of dry holes in the planning area is very low. Therefore, it is assumed that every hole that is drilled results in a completion.

Leasing of fluid minerals is typically in areas of low, moderate, or high potential for fluid leasable minerals and not in areas with no potential. However, lands are available for leasing throughout the planning area.

There would be low interest in developing geothermal resources during the planning period. Based on the CFO's experience from other areas and government programs that encourage development of renewable resources, 10 geothermal leases would be issued during the 20-year planning period in the area with known geothermal potential (Map 3-23) in northwest and central Eddy County. However, based on historical data, none of the leases would be actively explored through drilling or developed during the planning period.

Percentage estimates of lands open with standard lease terms and conditions, open with moderate constraints, open with major constraints, and closed to leasing are compared to BLM-administered surface lands and BLM-administered subsurface estate available for leasable mineral development for each alternative.

Solid Leasables

Potash occurs in the planning area in the Salado Formation east of the Pecos River. Areas with measured, indicated, or inferred reserves are considered high potential for development. Areas currently under lease or prospecting permits outside the reserve areas are considered to have moderate potential for development. The rest of the area east of the Pecos River is considered to have low potential for potash development. Based on a modest increase in demand for potash during the planning period, the projection for the planning period is that 20 prospecting permits or exploration licenses would be filed and processed, and 10 new leases would be issued. Two new traditional underground potash operations and three new solution potash operations are expected during the planning period in high or moderate potential areas.

Sodium occurs in the planning area in the subsurface Salado Formation from central Eddy County eastward to the Texas border (Map 3-24). The entire area is considered to have high potential for sodium. However, because the demand for sodium is static, only 10 prospecting permits or exploration licenses are expected to be processed during the planning period and five new leases are expected to be issued. No new underground sodium mines are expected during the planning period. Sodium mining from potash tailings are expected to continue over the next 20 years. These sodium operations would be located within existing leased areas for potash operations; therefore, the analysis contained within this section does not account for additional impacts from sodium mining from tailings as the impacts from potash already account for the surface disturbance from the tailings ponds.

Sulfur deposits occur at or near the base of the Castille Formation. For this reason, exploration for sulfur would likely be concentrated where the Castille is exposed at or near the surface (Map 3-26). Based on historic sulfur development activities in the planning area, all other areas are considered to have no potential for development of sulfur. Exploration for sulfur is expected to be sporadic during the planning period. Five prospecting permits or exploration licenses would be expected to be issued for sulfur exploration during the planning period, but no leases would be expected to be issued, nor would any deposits be expected to be developed.

Management Actions with No Impacts or Minor Impacts on Leasable Minerals

This section addresses management actions that would have either minor or no impacts on leasable minerals. A brief explanation of the rationale in determining minor or no impact is presented, and the management actions are not carried forward for detailed analysis in the leasable minerals subsection.

Backcountry Byways

Designations of backcountry byways and national recreation trails would have a minor adverse impact on leasable mineral development because proposed backcountry byways under all alternatives are in an area of low mineral development potential.

Cultural Resources

Conflicts between leasable mineral development and cultural resources would be resolved in accordance with regulations, policy, and the Permian Basin Programmatic Agreement between the New Mexico SHPO and the BLM, including consultation with tribes concerning mineral development. Continuation of the Permian Basin Programmatic Agreement would occur under all alternatives. Some policies may cause minor delays in mineral development to allow for surveys and/or agency consultation. However, based on historic mineral development within the planning area, the delays would not result in the reduction of land available for leasing, the number of leasable mineral operations, or the number of drilled wells.

Lands with Wilderness Characteristics

Closing lands with wilderness characteristics to mineral leasing or allowing leasing only with NSO stipulations would prohibit or limit leasable mineral development on these lands. Oil and gas or geothermal wells would have to be directionally drilled to develop the resources in these areas. Underground mines would have to be developed outside the lands with wilderness characteristics or the solid leasable resources would have to be developed in situ through directional drilling. Use of these technologies would increase the cost of development of leasable resources, which could translate to a loss of production and royalties. Table 4-137 summarizes the lands with wilderness characteristics identified for management to maintain wilderness characteristics under all alternatives.

Most of the areas identified as lands with wilderness characteristics under all alternatives would be outside the area with known low, moderate, or high potential for oil and gas, so fluid leasable minerals would not be impacted. There would be no impact on geothermal resources, because there is no potential for geothermal resources in areas proposed to be managed for their wilderness characteristics. Areas with wilderness characteristics are also outside the area with known low, moderate, or high potential for potassium, so potassium development would not be impacted. The existing sodium mines would also not be impacted, and no new underground sodium or sulfur mines are projected for the planning period.

Table 4-137. Lands with Wilderness Characteristics to Be Managed to Protect Wilderness Characteristics, by Alternative (acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
0	66,666	47,611	5,119	1,221

Livestock Grazing

The standards for rangeland health apply to reclamation of all leasable mineral operations in the planning area; however, these standards would not significantly increase the constraints placed leasable mineral operations nor affect leasing or the number of wells. Thus, livestock grazing has no impact on leasable mineral development.

Locatable Minerals

Locatable mineral mining operations would conflict with the location of leasable mineral operations; however, the low potential for development for locatable mineral deposits and the projection of only one locatable mineral operation during the planning period make the likelihood of conflict very remote. Therefore, locatable mineral actions would not affect the availability of land for leasing or leasable mineral operations.

Paleontological Resources

None of the paleontological resources decisions would impact the amount of land available for leasing or the number of leasable mineral operations.

Public Health and Safety

Leasable mineral operations already are required to follow all safety regulations and policies, including Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Administration (MSHA) rules. Requirements to upgrade visual and audible alarm systems for wells with concentrations of H_2S greater than 100 ppm would protect public health and safety without being cost-prohibitive.

Renewable Energy

The wind energy development potential area is in the vicinity of the Guadalupe Mountains where there is little or no potential for leasable mineral resources. Thus, conflicts between the potential wind energy development and fluid and solid leasable mineral development is not expected.

Solar energy development could occur across Eddy and Lea Counties, so conflicts with leasable mineral operations could occur. However, the acreage needed for solar development would be minimal relative to the BLM-administered lands available for leasable mineral development. No geothermal operations are projected in the areas identified for solar development, so there would be no impact on geothermal resource development. It is likely that no more than one potassium operation would be impacted, so the chances of conflict would be minimal. No new underground sodium or sulfur operations are projected during the planning period.

Salable Minerals

Typically, salable operations are part of the infrastructure that helps support oil and gas operations or solid leasable mine operations. Thus, the salable mineral decisions would have a beneficial effect for leasable mineral development. They would have a similar effect for geothermal development; however, the number of wells affected would be few.

Travel Management

Implementation of a comprehensive travel management plan would have a beneficial effect on leasable mineral development because it would identify roads that would be available for access up front so these routes can be projected during the cost estimation phase of operation planning. The travel management plan would have no impact on the availability of land for leasable mineral development or the numbers of wells or production facilities.

Limiting cross-country travel by motorized vehicles except travel related to a lease or permit would have a beneficial effect for leasable mineral development because it would limit the amount of public traffic in the vicinity of oil and gas facilities and mining operations, which would be a safety concern for leasable mineral operations. This requirement would not impact the availability of land for leasing or the number of productive wells. The Gold Book standards have been adopted by the oil and gas industry already, so the requirement for Gold Book standards for roads would have no impact on leasable mineral development.

Travel management decisions would affect leasable mineral development because access roads for exploration and development can be closed or their use restricted or limited temporarily. This would cause the costs of operations to increase or, in rare cases, prohibit the operations. These actions would directly impact access to mineral deposits or limit the type of vehicular traffic to access the deposits, which constrains and increases the costs of leasable mineral operations. However, typically access routes that coincide with existing roadways or access roads are authorized under the lease or permit. Thus, travel management decisions often have only a minor impact on leasable mineral operations. Furthermore, the areas closed to travel under each alternative are small in comparison to the size of the planning area (Table 4-138).

Table 4-138. Travel Management Decisions, by Alternative (acres of BLM-administered surface lands)

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	-	–	–	–	–
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Vegetation Management, Including Noxious Weeds

There are no vegetation management decisions considered in Chapter 2 that would impact the availability of leasable mineral leases or the numbers of wells or operations. Thus, vegetation management decisions would have no impact on leasable mineral development.

Water Resources

There are no water resource management decisions considered in Chapter 2 that would impact the lands available for mineral leases or the number of wells or operations. Thus, water resource management decisions would have no impact on leasable mineral development.

Wildland Fire Management

There are no management decisions considered in Chapter 2 for wildland fire management. Thus, wildland fire management actions would not impact the land available for leasing or the number of operations.

Cave and Karst Resources

There are no cave and karst resources management decisions considered in Chapter 2; therefore, there would be no impact to leasable minerals.

Riparian Resources

There are no riparian resources management decisions considered in Chapter 2 that would impact leasable minerals.

Soil Resources

There are no soil resources management decisions considered in Chapter 2; therefore, there would be no impact to leasable minerals.

Special Status Species

There are no special status species management decisions considered in Chapter 2; therefore, there would be no impact to leasable minerals.

Wildlife and Fish

There are no wildlife and fish management decisions considered in Chapter 2; therefore, there would be no impact to leasable minerals.

4.3.1.1.2 Direct and Indirect Impacts

Impacts of Leasable Minerals Actions on Leasable Minerals

Impacts from Management Common to All Alternatives

Under all alternatives, the BLM would continue to require mineral lessees to conduct operations in a manner that would minimize adverse impacts to other resources, land uses, and land users in accordance with regulations, orders, notices to lessees, lease stipulations. Mineral allocation decisions vary from those that prohibit operations to those that allow operations with little restriction other than those imposed by existing

local, state, and federal laws and regulations. Decisions that close land to leasing have a direct adverse impact on leasable mineral development whereas decisions that place restrictions on development have an adverse impact due to increased operation constraints. Table 4-139 summarizes the leasable mineral allocations on BLM-administered lands, by each alternative.

Table 4-139. Leasable Minerals Allocations, by Alternative (acres of BLM-administered surface land)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Open with moderate constraints (CSU)	956,410	799,649	449,759	786,381	631,634
Open with major constraints (NSO)	54,602	80,394	162,013	158,401	70,142
Closed	174,391	761,404	1,082,972	88,502	84,687
Total	***2,784,273***	***2,784,248***	***2,784,224***	***2,784,058***	***2,784,145***

Under all alternatives, the CFO would facilitate the development of public land leasable mineral resources, where compatible with resource objectives, to meet societal needs. This would have a beneficial effect on mineral leasing, exploration, and development.

Interactions between Solid Leasable Minerals and Fluid Leasable Minerals

Lands available for leasing of fluid leasable minerals coincide with lands available for leasing of solid leasable minerals under all alternatives, and the areas with known potential for development of oil and gas and geothermal resources overlap the lands known to have potential for development of potassium, sodium, and sulfur. As a result, conflicts between fluid and solid leasable mineral development would be likely in the planning area over the next 20 years.

Under all alternatives, fluid leasable minerals would continue to be leased in the potash area according to *Secretary's Order 3324 for Oil, Gas, and Potash Leasing and Development within the Designated Potash Area of Eddy and Lea Counties, NM*, as amended (Secretarial Order 3324, U.S. Department of the Interior [USDI] 2012). Management decisions associated with co-development of potash, oil, and gas deposits in the Secretary's potash area would impact fluid mineral development in two ways. First, oil and gas wells must be drilled a safe distance from the operating potash mines so that mine workings are protected. This would be a major restriction (mostly NSO) on the development of oil and gas wells, which would substantively increase constraints on drilling locations. Second, the formation containing the potash must be protected for eventual development through design of oil and gas downhole equipment. Also, in some cases, no resolution for the conflict between oil and gas and potash would be available, so the oil and gas resource would go untapped until some later date after mining ceases. This would be a direct adverse impact on immediate fluid leasable exploration and development.

The 497,000-acre potash area encompasses approximately 24% of BLM-administered surface lands available to leasable mineral development in the planning area. As many as 1,536 wells over the next 20 years could be impacted by the potash order through increased constraints or prohibitions on drilling.

In the Secretary's potash area, fluid leasable mineral development would be managed as described in Secretarial Order 3324 and fluid lease stipulations within the designated potash area would beneficially impact potash development. No such protection would exist for sodium or sulfur deposits nor would any fluid leasable management decisions apply to sodium and sulfur.

Outside the Secretary's potash area, preference for development of solid or fluid mineral leases would be given to the senior lessee on a first come–first served basis. Also, solid leasable mineral deposits would be protected through imposition of moderate downhole constraints on oil and gas well drilling. No fluid leasable mineral decisions would impact the land available for leasing of solid leasable minerals or the numbers of existing and projected solid leasable operations.

Impacts from the No Action Alternative

Under the No Action Alternative, 57% of BLM-administered surface lands (2,784,273 acres) would be open with standard stipulations. Approximately 956,410 acres (34%) of BLM-surface administered lands would be open with moderate constraints, which would impact the development of as many as 2,198 wells (based on percentage of the RFD projected number of 6,400 wells) over the life of the plan. The moderate constraints would also affect as many as one prospecting permit or exploration license for potassium and one prospecting permit or exploration license for sodium during the life of the plan. Approximately 54,602 acres (2%) of BLM-administered lands would be open with major constraints. This allocation may impact as many as 126 wells by increasing the cost of operations. This may affect as many as one prospecting permit or exploration license for potassium and one prospecting permit or exploration license for sodium during the life of the plan. Finally, 174,391 acres (6%) of BLM-administered lands would be closed to leasable mineral exploration and development. As many as 400 wells would be impacted by the closure to leasable mineral development on BLM-administered surface lands. In total, the projected total number of wells under the No Action Alternative is 5,874 wells on BLM-administered lands when considering areas closed to leasable mineral development and NSO areas. Because of the small acreage, this action would most likely have no impact on potassium, sodium, and sulfur exploration and development.

Impacts from Alternative A

Under Alternative A, 41% of BLM-administered land (1,142,802 acres) would be open with standard terms and conditions. Approximately 799,649 acres (29%) of BLM-administered lands would be open with moderate constraints (CSU), which could impact as many as 1,856 wells over the life of the plan. Because of the small acreage, this action would most likely have a negligible impact on potassium, sodium, and sulfur exploration and no impact on potassium and sodium mining. Approximately 80,394 acres (3%) of BLM-administered lands would be open with major constraints (NSO), which would impact 184 wells over the next 20 years. Approximately 761,404 acres (27%) of BLM-administered lands would be closed. As many as 1,750 wells on BLM-administered surface lands would be impacted by the closure to leasable mineral development. In total, the projected total number of wells under the Alternative A is 4,465 wells on BLM-administered surface lands when considering areas closed to leasable mineral development and NSO areas. The decision to close 761,404 acres would have a direct adverse impact on no more than five prospecting permits or exploration licenses for potassium, on three prospecting permits or exploration licenses for sodium, and one prospecting permit or exploration license for sulfur during the life of the plan because these lands would not be available for exploration.

Impacts from Alternative B

Under Alternative B, 39% of BLM-administered lands (1,089,481 acres) would be open with standard stipulations. Approximately 449,759 acres (16%) of BLM-administered lands would be open with moderate constraints (CSU), which would impact the development of as many as 1,024 wells. The CSU allocation would most likely not impact any prospecting permits or exploration licenses. Approximately 162,013 acres (6%) of BLM-administered surface lands would be open with major constraints (NSO). This allocation may impact approximately 372 wells. This action would impact as many as one potassium prospecting permit or exploration license and one sodium prospecting permit or exploration license. Approximately 1,082,972 acres (39%) of BLM-administered surface lands would be closed. As many as 2,489 wells would be impacted by the closure to leasable mineral development on BLM-administered lands. In total, the projected total number of wells under Alternative B is 3,538 wells on BLM-administered lands and when considering areas closed to leasable mineral development and NSO areas. If closed areas are in low, moderate, or high potential areas, this would impact no more than five potassium prospecting permits and licenses, one potassium lease, three sodium prospecting permits or exploration licenses, one sodium lease, or one prospecting permit or exploration license for sulfur.

Impacts from Alternative C

Under Alternative C, 63% of BLM-administered surface lands (1,750,774 acres) would be open with standard stipulations. Approximately 786,381 acres (28%) of BLM-administered surface lands would be open with moderate constraints (CSU), which would impact as many as 1,808 wells over the life of the plan. Moderate constraints would also affect as many as two potassium leases, one sodium lease, or one

prospecting permit or exploration licensed for sulfur during the life of the plan. Approximately 158,401 acres (6%) of BLM-administered lands would be open with major constraints (NSO). This allocation may impact as many as 364 wells. Major constraints would also impact as many as two potassium prospecting permits or exploration licenses, one potassium lease, or one sodium prospecting permit or exploration license. Finally, 88,502 acres (3%) of BLM-administered lands would be closed to leasable mineral development. As many as 203 wells would be impacted by the closure to leasable mineral development on BLM-administered lands. In total, the projected number of wells under Alternative C is 5,832 wells on BLM-administered lands when considering areas closed to leasable mineral development and NSO areas. Areas closed to leasable mineral development would most likely not impact any solid leasable prospecting permits, exploration licenses, or leases.

Impacts from Alternative D

Under Alternative D, 72% of BLM-administered surface lands (1,997,681 acres) would be open with standard stipulations. Approximately 631,634 acres (23%) of BLM-administered lands would be open with moderate constraints (CSU). Moderate constraints would impact as many as 1,452 wells over the life of the plan. Moderate constraints would impact as many as two potassium leases, one sodium lease, or one prospecting permit or exploration licensed for sulfur during the life of the plan. Approximately 70,142 acres (3%) of BLM-administered lands would be open with major constraints (NSO). Major constraints would impact as many as 161 wells over the life of the plan. The small acreage of lands open with major constraints would not impact any solid leasable mineral exploration permits or leases. Finally, 84,687 acres (3%) of BLM-administered lands would be closed to leasable mineral exploration and development. This may impact as many as 195 wells on BLM-administered surface lands. In total, the projected number of wells under Alternative D is 6,044 wells on BLM-administered lands when considering areas closed to leasable mineral development and NSO areas. The impact to solid leasable minerals would be negligible because of the small acreage.

Impacts of Air Resources Actions on Leasable Minerals

Impacts from Management Common to All Alternatives

Under all alternatives, oil and gas production facilities must comply with existing federal and state regulatory requirements for the protection of ambient air quality, including but not limited to EPA Nonroad Diesel Engine Emission Standards, New Mexico Administrative Code 20.2.38 Hydrocarbon Storage Facilities, and NESHAP (40 CFR 63, Subpart HH). The requirements would result in an adverse impact on leasable minerals because it would increase management constraints placed on operations.

Impacts from Management Common to All Action Alternatives

Within 1 year of the ROD, all new and existing drilling rig, completion rig, work-over rig, and fracturing pump engines would have to meet EPA Tier 4 Nonroad Diesel Engine Emission Standards or meet equivalent emission standards. This requirement probably would not result in a reduction of wells or facilities.

Pneumatic controllers and new and modified centrifugal or reciprocating compressors meeting EPA NSPS requirements would have to be installed at gas gathering and boosting stations, well sites, and gas processing plants. These requirements would increase the constraints placed on both existing and new operations but probably would not result in facility closure.

The requirement for new and modified natural gas sweetening units at gas processing plants to meet EPA NSPS requirements would increase the constraints placed on plant operations. However, this requirement probably would have little impact on the numbers of wells and no impact on the availability of land for leasing.

Impacts from the No Action Alternative

Under the No Action Alternative, stipulations would be imposed on all proposed projects to meet air quality standards. This is the same as the requirements under the Impacts from Management Common to All section, discussed above.

Impacts from Alternative A

Green completions involving recovery and clean-up of natural gas would be required for all natural gas and oil wells in accordance with EPA NSPS rules unless the need for an exemption can be documented. This requirement would increase the constraints placed on operations, but it is not expected to result in the abandonment of plans to drill.

During construction activities (including well drilling, completion, and work-over), twice daily watering (or equivalent) of construction areas and associated resource roads would be required to prevent at least 50% of fugitive dust from vehicular traffic, equipment operations, or wind events. This requirement would not result in a reduction of wells or facilities.

Emission controls would be required for oil tanks, condensate tanks, produced water tanks, and glycol dehydrators without regard to the location of the equipment or to the quantity of uncontrolled VOC emissions from the equipment in accordance with the EPA NESHAP. VOC emissions reduced by at least 95% from uncontrolled emission levels. This requirement would increase constraints placed on operations for existing productive wells (13,392). However, this requirement probably would not result in facility closure.

The requirement that at least 70% of gas compression at compressor stations (gathering, boosting, transmission, and gas plants), well heads, and oil well head pumps would be powered by electricity would be a direct adverse impact to leasable mineral development, which can impact the number of wells. Wells must produce a certain volume of product to pay for operations costs. If the costs are high, wells may be abandoned sooner because it becomes uneconomical to produce minerals.

Impacts from Alternative B

Green completions involving recovery and clean-up of natural gas would be required for all natural gas and oil wells in accordance with EPA NSPS rules unless the need for an exemption can be documented. This requirement would increase constraints placed on operations, but knowledge of the requirement up front allows operators to build requirement into their plans. Thus, it typically would not result in the abandonment of plans to drill.

Alternative B would have the same actions and impacts as Alternative A in regard to the fugitive dust, VOC emission controls, and electricity requirements.

Impacts from Alternative C

Operators must comply with all applicable EPA NSPS regulations, including those limiting emissions during well completions. Operators must also comply with all applicable BLM regulations pertaining to the venting and flaring of gas.

Glycol dehydrators located at well sites, gathering and boosting stations, gas processing plants, and natural gas transmission stations would be required to meet applicable EPA NESHAP. These requirements would increase the constraints placed on operations but would not result in facility closure.

Impacts from Alternative D

Alternative D would have the same actions and impacts as Alternative C in regard to the EPA NSPS Air Rules for the Oil and Gas Industry (2012), VOC emission controls, and electricity requirements.

Impacts of Land Tenure Actions on Leasable Minerals

Disposal of lands reduces the amount of land available for leasing. Thus, disposal of lands would have a direct adverse impact on leasable mineral development. If mineral rights are retained by the federal government, disposal would have no impact on the availability of land for leasing and, thus, no impact on leasable mineral development.

Retention zones include those lands specifically identified by the tribes as having special importance related to treaty and/or traditional uses/values; endangered, threatened, proposed, and candidate special status species habitat; NRHP-eligible and -listed properties; wildlife tracts for candidate or special status species;

and lands acquired under Land and Water Conservation Fund (LWCF). Although retained lands may be managed with restrictive prescriptions, typically retention of these types of lands would not reduce the amount of land available for leasing or impact the numbers of operations. Thus, retention of land would have no impact on leasable mineral development

Table 4-140 summarizes the lands identified for disposal and retention, by alternative.

Table 4-140. Land Tenure Actions (acres) by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Disposal	218,318	18,703	26,125	31,536	51,579
Retention	1,872,747	2,070,580	2,063,155	2,057,744	2,037,362

Impacts from the No Action Alternative

Approximately 218,318 acres would be eligible for disposal through sale, exchange, or some other title transfer. This would have a direct adverse effect on leasable mineral development because disposal would remove these lands from leasing and development, which would result in a loss of production and royalties. The acreage represents 10% of the total BLM-administered surface lands. Although leasing and development already is restricted in some of the lands identified for disposal (e.g., Waste Isolation Pilot Plant site), this would affect leasing and as many as 610 oil and gas wells during the next 20 years since most of the identified tracts are in low, moderate, or high oil and gas potential areas. Lands identified for disposal also encompass about 50% of the area known to have low potential for geothermal resources. This action would adversely impact about five geothermal leases. Land disposal would impact leasing and as many as two potassium exploration permits, one potassium lease, or one sodium lease. Sulfur would not be impacted because none of the lands identified for disposal occur in the area known to have potential for sulfur (see Map 3-32 [Land Tenure Disposal Lands] and Map 3-26 [Sulfur Potential].

Impacts from Alternative A

Under this alternative, 18,703 acres in the planning area would be eligible for disposal through sale or exchange or other title transfer. This action would potentially remove these lands from leasing and development. This would be 1% of the total BLM-administered surface lands, so about 64 oil and gas wells would be impacted during the next 20 years. No geothermal, potassium, sodium, or sulfur leases or operations would be impacted.

Impacts from Alternative B

Under Alternative B, 26,125 acres would be eligible for disposal and potentially removed from mineral leasing. This would be 1.3% of the total BLM-administered surface lands. As many as 83 wells would be affected during the next 20 years, leading to a loss of production and royalties. No geothermal, potassium, sodium, or sulfur leases or operations would be impacted.

Impacts from Alternative C

Under Alternative C, 31,536 acres would be disposed and removed from mineral leasing. This would be 1.5% of the total BLM-administered surface lands in the planning area. Approximately 96 wells would be affected during the next 20 years. Alternative C would have the same actions and impacts as Alternative A for retention of lands.

Impacts from Alternative D

Under Alternative D, 51,579 acres would be disposed and removed from mineral leasing. This would be 2.5% of the total BLM-administered surface lands in the planning area. Approximately 160 wells would be affected during the next 20 years. Alternative D would have the same actions and impacts as Alternative A for retention of lands.

Impacts of Land Authorization Actions on Leasable Minerals

Land authorization actions include issuance of ROWs for pipelines, power lines, roads, and sites, along with stipulations that govern the operations. Leasable mineral facilities and infrastructure must be located within ROWs if they are located beyond the lease boundaries, so land authorization decisions that allow for more orderly and easy access to leases and allow for efficient production would have a moderate beneficial effect on mineral development.

The primary land authorization action that impacts mineral development is the decision to designate ROW avoidance and exclusion zones to protect sensitive resources, such as visual resources, cave and karst areas, and special status species. Exclusion or avoidance zones do not preclude mineral development from occurring within the zone. However, the terms and conditions placed on mineral development ROW grants could increase the constraints placed on operations if leasable mineral development facilities, such as compressor plants, cannot be located close to wells. However, multiple use conflicts typically would be resolved through movement of the ROW or relocation of new wells.

Exclusions and avoidance decisions would have an indirect adverse impact on mineral development depending on how much acreage and how many wells are impacted. Table 4-141 summarizes the ROW avoidance and exclusion zones, by alternative.

Table 4-141. ROW Avoidance and Exclusion Zones Located on BLM-administered Lands in the Planning Area (acres)

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540
Open	2,051,927	798,544	757,380	1,610,692	1,749,782

Utility corridors would be designated as shown on Map 2-47. These corridors cross lands with low, medium, and high potential for fluid mineral development and would impact a large number of wells even though fluid mineral operations would not be prohibited in the corridors. It is not anticipated that solid leasable mineral operations would be impacted by utility corridors.

Impacts from the No Action Alternative

Under the No Action Alternative, 30,965 acres would be managed as ROW avoidance areas and no areas would be managed as ROW exclusions areas within the planning area, which is approximately 1% of BLM-administered surface lands in the planning area. Leasable mineral development would not be prohibited in these areas; however, geophysical exploration lines would have to avoid the corridors, and leasable mineral development would be restricted. These areas would indirectly impact as many as 128 wells during the next 20 years. Avoidance areas could impact one geothermal lease, but the impacts would be negligible. Two potassium exploration permits, one potassium lease, or one sodium exploration permit would be impacted. The ROW corridors would not likely impact sulfur exploration.

Impacts from Alternative A

Under Alternative A, 629,149 acres would be designated as a ROW avoidance zone and 662,038 acres as a ROW exclusion zone. Combined, this would be 64% of the total BLM-administered surface land, so the corridors would impact as many as 2,304 wells over the next 20 years.

Impacts from Alternative B

Under Alternative B, 413,654 acres would be designated as a ROW avoidance zone and 918,701 acres as a ROW exclusion zone. Combined, this would be 64% of the total BLM-administered surface land, so the ROW management areas would impact as many as 2,560 wells over the next 20 years. The likelihood of conflicts with solid leasable mineral development operations is remote.

Impacts from Alternative C

Under Alternative C, 505,975 acres would be designated as a ROW avoidance zone and 228,642 acres as a ROW exclusion zone. Combined, this would be 35% of the total BLM-administered surface land, so the ROW management areas would impact as many as 2,240 wells over the next 20 years. No impacts to solid leasable minerals are expected.

Impacts from Alternative D

Under Alternative D, 270,360 acres would be designated as a ROW avoidance zone and 69,540 acres as a ROW exclusion zone. Combined, this would be 16% of the total BLM-administered surface land, so the corridors would impact as many as 1,920 wells over the next 20 years. No impacts to solid leasable minerals are expected.

Impacts of Recreation Actions on Leasable Minerals

Table 4-142 summarizes leasable mineral acreage allocations for SRMAs and ERMAs in the planning area, by alternative.

Table 4-142. Leasable Mineral Allocations for Proposed SRMA and ERMAs, by Alternative (acres)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	1,477	1,533	7	1,528	1,533
Open with moderate constraints (CSU)	48,450	36,878	36,878	36,882	36,882
Open with major constraints (NSO)	6,008	9,483	10,085	9,983	11,218
Closed	13,534	2,096	3,018	1,275	40
Total	***69,469***	***49,991***	***49,988***	***49,669***	***49,673***

Impacts from Management Common to All

Development of RAMPs for SRMAs would have a beneficial effect for leasable mineral development because the management plans would identify mitigation during the mineral development planning stage, so the RAMP could be used during the design for mineral operations.

Impacts from the No Action Alternative

The Hackberry Lake OHV Area is in an area that has moderate and high potential for oil and gas and no potential for geothermal resources. Oil and gas locations could conflict with the OHV use area; however, the acreage represents only 2% of the total BLM-administered land available to mineral leasing, so no more than 128 wells would be affected during the next 20 years.

As shown in Table 4-142, under this alternative, 202 acres would be open with standard stipulations, 48,450 acres would be open with moderate constraints, and 6,008 acres with be open with major constraints. Only 13,534 acres would be closed to mineral leasing.

Decisions to close areas to leasing would be a direct adverse impact on leasable mineral development; however, 13,534 acres would be less than 1% of the total BLM-administered lands. Decisions to impose major or moderate constraints would increase the drilling costs, which can impact the decision to invest in exploration or operations. These decisions would impact 54,458 acres, which would be less than 2.0 % of the total BLM-administered lands. Most of the subject areas lie outside the geothermal potential zone, so there would be no impact on geothermal resources development. Even if all of the subject SRMAs and ERMAs are in areas known to have potential for potassium, sodium, or sulfur, most likely only one potassium lease and no sodium or sulfur leases or permits would be impacted.

Impacts from Alternative A

The Hackberry Lake OHV Area (36,889 acres) and the Alkali Lake Area (318 acres) are the preferred locations for recreational OHV use, and the Hackberry Lake OHV Area is the preferred site for commercial and organized competitive OHV events. Approximately 318 acres of the Alkali Lake Area would be managed to ensure that other land and resource uses would not interfere with organized recreational OHV use through NSO stipulations on leasable mineral development (major constraints), whereas Hackberry Lake would be managed with CSU (moderate constraints). However, the total acreage represents less than 1% of the total BLM-administered surface land, so no more than 128 wells, one potassium lease, and one sodium lease would be affected during the next 20 years.

As shown in Table 4-142, under this alternative, 1,533 acres would be open with standard stipulations, a total of 46,362 acres would be open but with moderate or major constraints, and 13,534 acres would be closed to leasing. Decisions to close lands would have a direct adverse impact on leasable mineral development. However, lands closed to leasing would represent a negligible amount of BLM-administered surface lands available to mineral leasing. Lands open with moderate and major constraints represent only 2% of the total BLM-administered lands available to mineral leasing.

Impacts from Alternative B

Alternative B would have the same actions and impacts as Alternative A in regard to the Hackberry Lake and Alkali Lake OHV areas.

As shown in Table 4-142, under this alternative, 7 acres would be open with standard stipulations, a total of 46,362 acres would be open but with moderate or major constraints, and 2,096 acres would be closed to leasing. Decisions to close lands would have a direct adverse impact on leasable mineral development. However, lands closed to leasing represents less than 1% of the total BLM-administered lands available to mineral leasing. Lands open with moderate and major constraints represent only 2% of the total BLM-administered lands.

Impacts from Alternative C

Under Alternative C, 1,341 acres of the Alkali Lake Area would be managed with NSO stipulations on leasable mineral development (major constraints), whereas Hackberry Lake would be managed with CSU (minor constraints). The total acreage represents only 2% of the total BLM-administered land, so no more than 128 wells, one potassium lease, and one sodium lease would be affected during the next 20 years.

As shown in Table 4-142, under this alternative, 1,528 acres would be open with standard stipulations, a total of 46,865 acres would be open but with moderate or major constraints, and 1,275 acres would be closed to leasing. Decisions to close lands would have a direct adverse impact on leasable mineral development. However, lands closed to leasing would represent less than 1% of the total BLM-administered lands available for mineral leasing. Lands open with moderate and major constraints would represent less than 2% of the total BLM-administered lands. At the most, one potassium or one sodium lease would be impacted.

Impacts from Alternative D

Under Alternative D, 1,342 acres of the Alkali Lake Area would be managed as open with standard terms and conditions, whereas Hackberry Lake would be managed with CSU. The acreage for the Hackberry Lake SRMA represents only 2% of the total BLM-administered land, so no more than 128 wells, one potassium lease, and one sodium lease would be affected during the next 20 years.

As shown in Table 4-142, under this alternative, 1,533 acres would be open with standard stipulations, a total of 48,100 acres would be open but with moderate or major constraints, and 40 acres would be closed to leasing. Decisions to close lands would have a direct adverse impact on leasable mineral development. However, lands closed to leasing would represent less than 1% of the total BLM-administered lands available to mineral leasing. Lands open with moderate and major constraints would represent less than 2% of the total BLM-administered lands. An estimated one potassium or one sodium lease would be impacted.

Impacts of Special Designations Actions on Leasable Minerals

Special designations considered within the RMP include ACECs, WSRs, and WSAs. Previously used special designations include RNAs, SMAs, historic sites, and Cultural Resource Management Areas (CRMAs). The designations of RNAs, SMAs, historic sites, and CRMAs would not be used in the new RMP. The areas would be designated as an ACEC or managed without a special designation. ACECs would replace most of the RNAs, SMAs, historic sites, and CRMAs under all action alternatives. WSRs would be recommended as suitable for inclusion in the NWSRS depending on the alternative decisions. WSAs in the planning area are already defined and await Congressional action, so the WSAs would be managed under the non-impairment standard. No wilderness areas exist in the planning area.

It is important to note, if Congress decides not to designate a river segment as part of the NWSRS, the protection management outlined in this section as WSRs would no longer apply. These segments would be managed according to decisions in other sections of the RMP. The impacts of these decisions on leasable mineral development are addressed in the riparian, water, special status species, and wildlife and fish sections.

Under all alternatives, WSAs would be managed as NSO or closed to leasing and existing leases would not be reissued after they expire. Lease closure would be a direct adverse effect on leasable mineral development. However, all the WSAs are in areas with no known potential or low potential for leasable minerals. Further, the total combined acreage under each alternative of the WSAs would be 7,086, which would represent only 0.3% of the total BLM-administered lands available to mineral leasing. Presumably, the WSAs would impact at most 0.3% of the low potential oil and gas resource (19 projected wells) or one well during the next 20 years.

If WSAs are not designated as wilderness areas by Congress and were released from WSA status, the lands would be managed closed to leasable development under Alternatives A through C and as open with major constraints under Alternative D. The effects of this decision would be negligible because of the small acreage (7,086 acres) included in the WSA lands.

Table 4-143 summarizes the leasable mineral allocations within proposed ACECs within the planning area.

Table 4-143. Proposed ACECs and Associated Leasable Mineral Allocations, by Alternative (acres)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	1,438	71,191	61,907	33,947	–
Open with moderate constraints (CSU)	–	1,389	4,732	19,932	–
Open with major constraints (NSO)	4,816	22,870	98,534	16,644	9,766
Closed	7,262	399,592	396,260	28,120	19,127
Total*	***13,516***	***495,042***	***561,433***	***98,643***	***28,894***

*Total may not sum correctly due to rounding.

Maps 2.58–2.62 (WSAs and WSRs) and Maps 2.53–2.57 (ACECs) show the locations of special designations under all alternatives, Map 3-23 shows the land with geothermal potential, and Map 3-22 shows the area with known oil and gas potential. Map 3-28 shows the land with potassium potential, Map 3-24 shows the area with known sodium potential (subsurface salt), and Map 3-26 shows the land with potential for development of sulfur.

Impacts from the No Action Alternative

All the SMAs overlap the known leasable mineral potential areas to some degree except the Lonesome Ridge, Six Shooter, and Serpentine Bends areas. Management decisions for these areas have no impact to leasable mineral development. Only the Seven Rivers Hills, Cave Resources, Pecos Bluntnose Shiner Habitat, and Birds of Prey areas overlap the area known to have potential for geothermal resources. Management decisions in all other special designated areas would have no impact on geothermal development.

As shown in Table 4-143, under the No Action Alternative, 1,438 acres special designations would be open to leasable mineral development with standard lease terms and conditions. No acreage would be open with moderate constraints. Approximately 4,816 acres would be open to leasing but with major constraints like NSO. This would have the effect of increasing constraints on mineral operations, which could impact the investment decision whether to drill or mine.

Under this alternative, only 7,262 acres would be closed to mineral leasing. Overall, at the most, leasing would be precluded on only 0.3% of the total BLM-administered lands available to mineral leasing. So, at the most, these decisions would impact 6 oil and gas wells and one exploration permit or license for potassium, sodium, or sulfur during the 20 years and probably not impact any geothermal leases.

Impacts from Alternative A

Under this alternative, 399,592 acres within ACECs would be closed to leasing for leasable minerals, which is approximately 14% of the BLM-administered lands available to mineral leasing. This is a direct adverse effect on leasable mineral development. However, the Birds of Prey Grasslands ACEC closure would make up 340,511 acres or about 87% of the total closure area, and only about one-third of the Birds of Prey Grasslands ACEC (approximately 114,000 acres) overlaps areas with known potential for oil and gas or geothermal resources. Thus, about 227,000 acres of the closure would not have any potential for oil and gas or geothermal development. Additionally, the Birds of Prey Grasslands ACEC is outside the area known to have potential for solid leasable minerals. Therefore, approximately 163,000 acres or about 5.9% of the total BLM-administered lands available for mineral leasing would be removed from leasing in areas with oil and gas or geothermal potential under this alternative. Because most of the land in this alternative overlapped by a special designation is low, moderate, or high potential for oil and gas and low potential for geothermal resources, as many as 512 oil and gas wells would not be drilled and one geothermal lease would not be issued during the next 20 years. At most, one solid leasable permit or lease would be impacted by the closure.

An additional 22,870 acres of land would be open with major (NSO) constraints. This would represent only 0.2% of the total BLM-administered land, which would translate to an impact on 64 wells during the next 20 years. Constraints would be increased for these wells, which can affect the decision whether to drill. No solid leasable permits or leases are expected to be impacted by the major constraints.

Under this alternative, both the Black and Delaware Rivers would be recommended as suitable for inclusion in the NWSRS (Map 2-59). The combined acreage of both river segments would be less than 1% of the total BLM-administered lands.

Impacts from Alternative B

Under this alternative, 399,592 acres would be closed to leasing, which would be a direct adverse effect on leasable mineral development. As discussed under Alternative A, 340,511 acres of these closed lands would be the Birds of Prey Grasslands ACEC, two-thirds of which would be outside the area known to have potential for oil and gas. Only about 114,000 acres of the closed Birds of Prey Grasslands ACEC would overlap the known potential areas. Thus, only about 140,000 acres would be closed to oil and gas or geothermal development where there is potential for fluid leasable minerals. This would represent 4% of the total BLM-administered lands. Thus, the closure would impact as many as 448 wells over the next 20 years. No solid leasable permits or leases would be impacted by the lands closed to mineral development because 93% of the closed lands are located outside the area known to have potential for solid minerals.

Under this alternative, 98,534 acres would be open for leasing but have major constraints. This would increase the constraints placed on mineral development, which can have an impact on the investment decision whether to drill. This represents 3.5% of the total BLM-administered lands available for mineral leasing, so as many as 320 oil and gas wells and one solid leasable exploration permit that would be impacted during the next 20 years.

Under this alternative, the Black River would be recommended as suitable for inclusion in the NWSRS, but the Delaware River would not (Map 2-60). The acreage of the Black River segment would be less than 1% of the total BLM-administered lands.

Impacts to geothermal resources under this alternative are the same as Alternative A.

Impacts from Alternative C

Under this alternative, only 28,120 acres would be closed to leasing of leasable minerals. This would represent 0.6% of the total BLM-administered lands. Approximately 16,644 acres of the ACECs would be managed with major constraints, which can affect the decision whether to drill or mine on approximately 0.6% of the total BLM-administered land acreage. Because much of this acreage lies in areas with only low potential for oil and gas, this translates to only about three oil and gas wells and one solid leasable exploration permit that would be impacted during the next 20 years.

Under this alternative, 19,932 acres would be managed under moderate constraints for leasable minerals Moderate constraints would increase the costs of drilling and operations, which in the rare case would lead to a decision not to drill or early abandonment of production facilities. Approximately, 64 oil and gas wells would be impacted by moderate constraints during the next 20 years.

Under this alternative, the Black River would be recommended as suitable for inclusion in the NWSRS, but the Delaware River would not (Map 2-61). The acreage of the Black River segment would be less than 1% of the total BLM-administered lands.

Impacts to geothermal resources under this alternative are the same as Alternative A.

Impacts from Alternative D

Under Alternative D, 19,127 acres of land would be closed to leasable minerals. This would represent 1.0% of the total BLM-administered lands available for leasing, although most of the closed acreage would be outside the areas known to have potential for leasable mineral resources. Approximately 9,766 acres under this alternative would be managed with major constraints, which represents less than 1% of the total BLM-administered lands. Because most of the acreage would be in low oil and gas potential areas, only about two oil and gas wells would be impacted during the next 20 years. No solid leasable exploration permits or license would be impacted. Under this alternative, 201 acres would be managed with moderate constraints.

Under this alternative, the Black River would be recommended as suitable for inclusion in the NWSRS, but the Delaware River would not (Map 2-62). The acreage of the Black River segment would be less than 1% of the total BLM-administered lands. No solid leasable exploration permits or license would be impacted.

Impacts to geothermal resources under this alternative are the same as Alternative A.

Impacts of Visual Resources Actions on Leasable Minerals

VRM Class I and II severely constrain leasable mineral operations. VRM Class I is almost prohibitive to leasable mineral development because mitigation typically would increase the costs of operation to the point where it would no longer be economically viable. VRM Class II mitigation would increase constraints placed on mineral development and be cost-prohibitive in some locations. These impacts could influence the investment decision whether to drill or continue operations. VRM Class III constrains operations, but less than Class I and II areas. VRM Class IV is the least restrictive, and constraints placed on mineral development typically are minimal.

Under all alternatives, careful planning can help proponents design operations around VRM requirements. Whatever the case, VRM requirements would impact leasable mineral operations by requiring mitigation measures to reduce the visual impacts to the landscape form mineral development.

Table 4-144 summarizes the VRM decisions on BLM-administered surface lands, by alternative. The impacts to leasable mineral development are discussed under each alternative below.

Table 4-144. VRM Classes on BLM-administered Surface Lands by Alternative (acres)

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205
Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Total	***2,783,858***	***2,783,514***	***2,783,481***	***2,783,558***	***2,783,585***

Impacts from Management Common to All Action Alternatives

The requirement that all non-temporary facilities and structures be screened, painted, and designed to blend with the surrounding landscape except where safety indicates otherwise. This decision would have little impact on new wells because mitigation is typically incorporated in the design early in the mineral development process.

Impacts from the No Action Alternative

Under this alternative, 7,058 acres of BLM-administered surface lands would be managed as VRM Class I, and much of this land is located outside areas known to have potential for leasable minerals. Thus, this decision has no impact on leasable mineral development.

Approximately 43,613 acres of BLM-administered lands would be managed as VRM Class II, which accounts only 2% of BLM-administered lands. Thus, the decision would at most impact 149 wells.

Under this alternative, 402,725 acres of BLM-administered surface lands would be managed as VRM Class III. This would be 14% of BLM-administered lands in the planning area. Mitigation such painting and facility design would increase the costs of leasable operations but probably would not preclude development. Approximately, 2,330,462 acres (84%) of BLM-administered lands would be managed as VRM Class IV with little or no constraint on leasable mineral development.

Low profile tanks and structures would be a requirement in VRM Class I and II areas, and in some cases in VRM Class III. This would increase the constraints placed on operations at oil and gas or geothermal facilities. However, this decision would have no impact on leasable mineral development for land assigned to VRM Class I because these lands are closed to leasing anyway and outside the oil and gas and geothermal potential areas. The decision would only impact 2% of the resources in VRM Class II areas. Most likely, this requirement would only affect a few wells and exploratory drill holes in VRM Class III areas.

Impacts from Alternative A

For the planning area, a total of 37,764 acres of BLM-administered lands would be managed as Class I, which would amount to 1.4% of the total BLM-administered surface lands in the planning area. Most of the VRM Class I acreage is located in WSAs where leasable mineral development would not occur.

For the planning area, 235,946 acres of BLM-administered surface lands would be managed as VRM Class II, which would be 8% of BLM-administered surface lands in the planning area. This would constrain operations and cause some operations to be relocated. This decision could affect as many as 671 new federal wells, 84 split estate wells, one exploration permit or license, and one solid mineral lease during the next 20 years, although some of the areas with VRM Class II requirements would be closed to leasable mineral leasing under this alternative.

Approximately 367,205 acres of BLM-administered lands would be managed as VRM Class III. This would represent 13% of the BLM surface lands, respectively, in the planning area. In these areas, mitigation would include facility design and painting to ensure that mineral operations fit in to their surroundings. Some of the VRM Class III areas already restrict leasable mineral development, but most of the areas are open to leasing.

Under Alternative A, 2,142,600 acres (77%) of BLM-administered lands would be managed as VRM Class IV.

Low profile tanks would be would not be allowed in VRM Class I, and low profile tanks and structures would be required in VRM Class II and III areas on a case by case basis. In VRM Class I areas, this would prohibit leasable mineral development or require tank burial. However, under this alternative, VRM Class I areas are outside the areas known to have potential for leasable minerals. Thus, the decision would have no impact on leasable mineral development in VRM Class I areas. In VRM Class II and III areas, this decision could impact a large number of wells and operations if low profile tanks were required in every case.

Impacts from Alternative B

Under this alternative, 42,102 acres of BLM-administered lands would be managed as VRM Class I, which would represent less than 2% of BLM-administered lands in the planning area. The subject areas would be closed to leasing or lie outside areas known to have potential for leasable minerals.

Approximately, 315,700 acres of BLM-administered lands would be managed as VRM Class II, which would represent 11% of BLM-administered lands in the planning area, respectively. This would constrain operations and cause some operations to be relocated.

Under this alternative, 294,177 acres of BLM-administered lands would be managed as VRM Class III. This would be 11% of BLM-administered surface lands in the planning area, respectively. In these areas, mitigation would include facility design and painting to ensure that mineral operations fit in to their surroundings. Under this alternative, 2,131,501 acres (77%) of BLM-administered lands would be managed as Class IV. Any mitigation required in these areas would be minimal.

Alternative B would have the same actions and impacts as Alternative A for low profile tanks.

Impacts from Alternative C

For the planning area, a total of 7,171 acres of BLM-administered lands would be managed as VRM Class I, which would amount to 0.3% of BLM-administered lands in the planning area. VRM Class I requirements would severely constrain or preclude leasable mineral development. However, most of the acreage is in WSAs where leasable mineral development would not occur anyway.

Approximately, 60,791 acres of BLM-administered lands would be managed as Class II. Most of the VRM Class II area would be outside the areas known to have potential for leasable minerals.

Under this alternative, 549,329 acres, or 20% of BLM-administered lands in the planning area, would be managed as Class III. Mitigation like painting and facility design would be required to ensure the facility fits in with the surrounding landscape. Under this alternative, 2,116,266 acres (78%) of BLM-administered lands would be managed as VRM Class IV. VRM Class IV mitigation would have only a minimal impact on operations.

Alternative C would have the same action and impact as Alternative A for low profile tanks.

Impacts from Alternative D

For the planning area, a total of 7,171 acres of BLM-administered surface lands would be managed as VRM Class I, which is the same as Alternative C. Approximately 41,092 acres (.3%) of BLM-administered lands would be managed as VRM Class II.

Under Alternative D, 546,205 acres (20%) of BLM-administered lands would be managed as VRM Class III. In these areas, mitigation would include facility design and painting to ensure that mineral operations fit in to their surroundings. Under this alternative, 2,189,116 acres (79%) of BLM-administered lands would be managed as VRM Class IV. Any mitigation associated with VRM Class IV would be minimal.

Alternative D would have the same action and impact as Alternative A for low profile tanks.

4.3.1.2 Locatable Minerals

4.3.1.2.1 Analysis Methods

This section describes potential impacts on the locatable minerals resource and activities from management actions for other resources and other management programs. The Locatable Minerals section of Chapter 3 describes existing locatable minerals resource conditions (see Section 3.3.1.4.2).

Indicators

The impact indicators used in this analysis that can be used to measure the impacts of management decisions on locatable mineral development in the reasonable foreseeable future are:

- acres of BLM-administered lands available for location and entry under the General Mining Laws;
- number of mining claims; and
- number of locatable mineral mines predicted to be opened in the planning period.

Land use management planning decisions may have a direct impact on and result in an increase or reduction of lands available for mining claim location or the number of productive mines.

Methods and Assumptions

This section describes the methods and assumptions used in the impacts analysis for the locatable minerals resource. Actions that limit the acres available to locatable minerals development are considered adverse because fewer acres available for mineral development restrict exploration and potential development of mineral resources within the planning area. Actions that increase the acres available to locatable minerals development are considered beneficial because fewer restricts facilitate the development of mineral resources within the planning area.

In general, the greater the number of acres affected, the greater the impact on the resource. Other actions may affect the accessibility of the locatable minerals resource, and these would likely lead to increased project costs by delaying operations or production. However, these actions would not affect the locatable minerals resource itself, and are not discussed in detail. Even in the extreme example that a number of such limitations resulted in such high project costs that the project became uneconomic, those acres of locatable minerals resource would still be available.

The amount of constraint on locatable mineral development in each alternative was quantified through analysis of the locatable mineral allocations and management actions for other resources. Some management direction in the sections analyzed in detail that would affect locatable mineral development cannot be quantified. In these cases, impacts are characterized as increasing or decreasing the amount of constraint on locatable mineral development.

Assumptions were developed based on interdisciplinary team knowledge of locatable mineral development and the planning area. These assumptions should not be construed to confine or redefine management contained within alternatives. Also, the assumptions were used to allow a comparison of impacts to locatable mineral development resulting from land use plan decisions in each of the alternatives.

Based on historical data and only one producing mine, the development potential for locatable mineral deposits is low across the entire planning area. This analysis assumes locatable mineral development is expected to occur at levels similar to the past. One mining claim and one locatable mineral mine is projected for the planning period.

The potential for development activity for mineral specimen gypsum and gemstones is moderate in southwestern Eddy County and low throughout the rest of the planning area for all other locatable minerals (e.g., gypsum, metallurgical-grade limestone, and many metals and non-metals) during the planning period.

Any areas recommended for withdrawal in the RMP would be withdrawn by Congressional, Secretarial, or Executive Order. As a result, acres recommended for withdrawal and those already withdrawn would be assumed to be unavailable for locatable mineral development for the purposes of this analysis. Locatable minerals on these lands are considered to be inaccessible.

Aside from the locatable mineral allocations, most management in the RMP that would affect locatable mineral development provides direction for reclamation or mitigation activities rather than direction for where location of mining claims may occur. This management, rather than preclude locatable mineral development in an area, would likely increase the costs associated with the development.

Locatable minerals management applies to mineral entry on federal mineral estate, including split-estate lands. Split estate lands are those where the federal government owns either the mineral estate or surface estate and another entity owns the other.

Management for areas within VRM Class I and II would result in more constraint on locatable mineral development than areas within VRM Class III and IV. It is assumed that more mitigation measures would be placed on mineral development in VRM Class I and II areas than in Class III and IV areas to ensure mineral development is appropriately designed for the surrounding landscape.

The occurrence of a locatable mineral does not imply that the mineral can be economically developed. Mineral occurrence potential includes both exploitable and potentially exploitable occurrences.

The locatable minerals resource discussed and analyzed in this document consists of only those acres of mineral ownership administered by the BLM. Not included are lands administered by the NPS, USFS, U.S. Bureau of Reclamation, and U.S. Department of Energy.

Notice-level operations do not require approval from the BLM (i.e., no federal action is required) but do require BLM acknowledgement and an acceptable reclamation bond. Such operations also are still bound by statutory requirements, including the Endangered Species Act, the NHPA, and the requirement under the Federal Land Policy and Management Act (FLPMA) to prevent unnecessary and undue degradation of public lands.

Development of locatable minerals resources may or may not involve the BLM. Federally administered locatable minerals resource in lands with BLM surface ownership is developed through BLM-approved actions (see Chapter 3). Development of federally owned locatable minerals resources in lands with private or state-owned surface are approved and handled by those entities. However, if an operator cannot obtain the private surface owner's written consent on Stock Raising Homestead Act or certain other lands, the BLM would administer the surface estate according to regulations in 43 CFR 3809 for surface-disturbing activities (in accordance with 43 CFR 3809.31). The administration of mineral estate in other lands, including those that have been sold, transferred, or acquired by the federal government, may operate differently (see 43 CFR 3800). Operations not involving the BLM are subject to all appropriate statutory requirements.

Any alternative that restricts locatable minerals activities (mining claim location, exploration, and development) would have some adverse impact on the potential use of the locatable minerals resource.

Restrictions on the locatable minerals resource (acres open to activities) and/or activities (mining claim location, exploration, and development) apply for the duration of the planning period. However, there could be changes through RMP amendments or changes in regulations.

Only a few management actions under the alternatives could affect the locatable minerals resource (acres open to locatable minerals activities). These would involve either withdrawing or segregating areas from mineral entry (operation under the mining laws). These actions (withdrawal or segregation) would close those areas to all locatable minerals activities (mining claim location, exploration, and development), subject to valid existing rights.

Except in areas withdrawn or segregated from mineral entry, mining claimants (as defined in 43 CFR 3830.3 and 3830.5) have an inherent right to locate claims, explore, and mine. The BLM cannot revoke this right.

Management Actions with No Impacts or Minor Impacts on Locatable Minerals

This section briefly addresses management actions would have either minor or no impacts on locatable minerals. A brief explanation of the rationale in determining minor or no impact is presented, and the management actions are not carried forward for detailed analysis in the locatable minerals subsection.

Air Resources

Requirements under all alternatives for diesel engine emission standards (EPA Tier 4 Nonroad Diesel Engine Emission Standards or equivalent for specific oil and gas production operations) to control fossil fuel emissions, and daily watering of construction areas to control fugitive dust would increase the operations constraints placed locatable mineral operations but not substantially. No operations would be curtailed because of the increased constraints.

Backcountry Byways

When backcountry byways and national recreation trails are designated in the future, they may encroach on existing or planned locatable mineral operations. Existing operations would not be impacted; however, mitigation requirements would most likely be imposed on the operations that postdate the backcountry byway designations. The conditions would most likely not preclude locatable mineral development under any of the alternatives.

Cultural Resources

Conflicts between locatable mineral development and cultural resources would be resolved in accordance with regulations, policy, and the Permian Basin Programmatic Agreement between the SHPO and the BLM, including consultation with tribes concerning mineral development. Some policies may cause minor delays in locatable mineral development, but the delays would not reduce the land available for location or the number of locatable mineral operations.

Continuation of the Permian Basin Programmatic Agreement for the protection of cultural resources would have a beneficial effect on locatable mineral development because it would continue to provide data and information that can be used to mitigate cultural resource–locatable mineral conflicts. However, efforts under the agreement would not increase the land available for location or increase the numbers of operations.

Land Authorizations

Utility corridors and communication sites can be in direct conflict with locatable mineral operations. However, only one locatable mineral operation is projected for the planning period, so the likelihood of conflict is unlikely. Minor ROWs typically have no impact on locatable mineral operations. Major ROWs for wind and solar power generation can be segregated from location and entry under the mining laws if conflicts are anticipated.

Leasable Mineral Resources

The locations of oil and gas wells and geothermal facilities can conflict with the locations of locatable mineral operations. However, only one locatable operation is projected during the planning period, so the likelihood of conflict is very remote. The impact of conflicts would be negligible. Also, none of the leasable decisions would have any impact on the availability of land for location and entry or the number of locatable mineral operations.

No lands would be specifically set aside under any alternative for development of solid leasable minerals, so the only impact on availability of lands for locatable mineral development would be conflicts with existing and projected solid leasable mines. Existing and projected solid leasable mines would be in eastern Eddy and western Lea Counties where the potential for locatable minerals is low. No additional sodium and sulfur mines are projected to be developed during the planning period.

Livestock Grazing

The standards for rangeland health apply to reclamation of all locatable minerals operations in the planning area; however, these standards would not significantly increase the constraints placed on locatable mineral operations or impact lands available for location and entry.

Paleontological Resources

There are no paleontological resources decisions considered in Chapter 2; therefore, there would be no impact to the amount of land available for location and entry under the mining laws or the number of locatable mineral operations.

Public Health and Safety

Locatable mineral operations already are required to follow all safety regulations and policies, including OSHA and MSHA rules. Management actions to enforce rules have no impact on locatable mineral development. Also, development of health and safety databases and monitoring has no impact on locatable mineral development. Thus, health and safety decisions under all alternatives have no impact on locatable mineral development.

Renewable Energy

Solar and wind projects would encompass significant acreage in the planning area. The wind resource maps (Map 3-28) show that most of the wind potential is in the Guadalupe Mountains. Solar resource maps illustrate that solar projects could be located throughout the planning area, although solar projects would most likely be situated near existing transmission corridors. Locations of both wind and solar projects could overlap with locatable mineral deposits; however, solar and wind energy project lands can be segregated from location and entry under the mining laws. Additionally, only one locatable operation is projected in the planning area for the planning period. Thus, the chances of location conflicts between wind and solar energy projects and locatable mineral operations would be minimal.

Riparian Resources

There are no riparian management decisions considered in Chapter 2 that would impact locatable minerals.

Salable Mineral Resources

The only impacts of salable mineral development on locatable mineral development would be a conflict from the location of existing and projected mines. Only one locatable mine exists in the planning area, and only one is projected for the planning period. Thus, the likelihood of a location conflict is remote. Additionally, ample supplies of salable mineral resources occur throughout the planning area removed from the one producing locatable mineral mine, so a conflict with location again is unlikely. Thus, salable mineral actions would have no impact on locatable mineral development.

Soil Resources

There are no soil resources management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

Travel Management

Travel management decisions can limit cross-country travel and restrict travel to established routes. These decisions have an adverse impact on locatable mineral exploration and development because these restrictions would increase the constraints placed on exploration operations. Requirements to design and restore roads to Gold Book standards would have little impact on locatable operations because access and haul roads would have to be built to high standards to withstand use by mineral extraction equipment. None of the decision under all alternatives would impact the availability of land for location and entry under the mining laws nor would they impact the number of operations.

Vegetation Resources, Including Noxious Weeds

There are no vegetation management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

Water Resources

There are no water resources management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

Wildland Fire Management

There are no wildland fire management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

Cave and Karst Resources

There are no cave and karst resource management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

Special Status Species

There are no special status species management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

Wildlife and Fish

There are no wildlife and fish management decisions considered in Chapter 2; therefore, there would be no impact to locatable minerals.

4.3.1.2.2 Direct and Indirect Impacts

Impacts of Locatable Minerals Actions

Impacts from Management Common to All

Unless withdrawn or segregated from location and entry under the General Mining Laws, the planning area would be available for location of mining claims. This decision would be beneficial for locatable mineral development because it would allow for widespread exploration and development.

Under all alternatives, the BLM would encourage and facilitate the development of public land mineral resources by private industry so that national and local needs are met. Environmentally sound exploration, extraction, and reclamation practices would be used.

Table 4-145 summarizes the locatable mineral allocations on BLM-administered surface lands in the planning area, by alternative. Table 4-146 summarizes the locatable mineral allocations on BLM-administered subsurface estate, also known as split estate. The sections below describe the impacts to locatable minerals from each alternative.

Table 4-145. Locatable Mineral Allocations, by Alternative, on BLM-administered Surface Lands (acres)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open to mineral entry	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
Recommended (or previously recommended) for withdrawal	32,374	380,990	673,996	132,249	122,444
Total	**2,784,229**	**2,784,105**	**2,784,094**	**2,784,104**	**2,784,149**

The largest amount of land would be open to mineral entry under the No Action Alternative and Alternative D. The least amount of land would be open under the Alternative B. Under Alternative B, the largest amount of land would be withdrawn or segregated from location and entry under the General Mining Laws, which

would be 24% of the total BLM-administered lands available to locatable mineral development. The least amount of land would be withdrawn from mineral entry under the No Action Alternative. Exploration and development would not be curtailed in these lands designated as open, except for stipulations and mitigation to prevent unnecessary or undue degradation of the lands and resources.

Impacts of Land Tenure Actions on Locatable Minerals

Disposal of lands would have a direct adverse impact on locatable mineral development because the lands would no longer be available for sales or permits. If mineral rights are retained, disposal would have no impact on the availability of land for mineral entry and, thus, no impact on locatable mineral development.

Retention zones include those lands specifically identified by the tribes as having special importance related to treaty and/or traditional uses/values; endangered, threatened, proposed, and candidate special status species habitat; NRHP-eligible and -listed properties; wildlife tracts for candidate or special status species; and lands acquired under the LWCF. Although retained lands may be managed with restrictive prescriptions, typically retention of these types of lands would not reduce the amount of land available locatable mineral development. Thus, retention of land would have no impact on locatable mineral development. Table 4-146 summarizes the lands identified for disposal and retention, by alternative.

Table 4-146. Land Tenure Actions (acres), by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Disposal	218,318	18,703	26,125	31,536	51,579
Retention	1,872,747	2,070,580	2,063,155	2,057,744	2,037,362

Impacts from the No Action Alternative

Disposal of about 218,318 acres of public land would have a direct adverse impact on locatable mineral development because the lands would no longer be available for sales or permits. This would represent about 10% of BLM-administered lands that would not be available for exploitation under the mining laws.

Impacts from Alternative A

Under this alternative, 18,703 acres in the planning area would be disposed through sale or exchange or other title transfer. This action would remove these lands from location and entry under the mining laws. This would be less than 1% of the total BLM-administered surface lands that would be removed from locatable mineral exploitation.

Impacts from Alternative B

Under Alternative B, 26,125 acres would be disposed and removed from location and entry under the mining laws. This would be 1% of the total BLM-administered lands that would not be available for locatable mineral exploitation.

Impacts from Alternative C

Under Alternative C, 31,536 acres would be disposed and removed from location and entry under the mining laws. This would be 2% of the total BLM-administered lands that would not be available for locatable mineral exploitation.

Impacts from Alternative D

Under Alternative D, 51,579 acres would be disposed and removed from location and entry under the mining laws. This would be 2% of the total BLM-administered lands that would not be available for locatable mineral exploitation.

Impacts of Lands with Wilderness Characteristics Actions on Locatable Minerals

Under all action alternatives, portions of lands with wilderness characteristics that are managed to protect their wilderness characteristics would be withdrawn from location and entry under the mining laws. This decision would have a direct adverse impact on the lands available for location and entry. Table 4-147 summarizes the lands with wilderness characteristics that would be withdrawn from mineral entry, by alternative.

Table 4-147. Lands Managed to Protect Wilderness Characteristics, by Alternative (acres)

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
0	66,666	47,611	5,119	1,221

Under Alternative A, 66,666 acres would be managed to protect wilderness characteristics, and would be withdrawn from location and entry under the mining laws. This would represent 3.1% of BLM-administered lands available to locatable mineral development. Neither exploration nor development would be allowed on these lands. The fewest acres of lands with wilderness characteristics would be withdrawn from mineral entry under the No Action Alternative. Alternative B would result in 2.3% of the total BLM-administered lands withdrawn from mineral entry to protect lands with wilderness characteristics. Alternative C would result in 0.2% and Alternative D would result in 0.1% of the total BLM-administered lands withdrawn from mineral entry to protect lands with wilderness characteristics.

Impacts of Recreation Resources Actions on Locatable Minerals

Table 4-148 shows the locatable mineral allocations for each alternative for SRMAs and ERMAs in the planning area. Lands in the proposed SRMAs and ERMAs may be open to location and entry under the mining laws or withdrawn.

Table 4-148. Locatable Mineral Allocations for Proposed SRMAs and ERMAs, by Alternative (BLM acres)

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	55,185	40,179	52,971	53,53,616	47,062
Withdrawn	14,282	12,786	23,583	13,351	12,066
Total	***69,467***	***52,965***	***76,554***	***66,967***	***59,128***

* Total may not sum correctly due to rounding.

Withdrawing lands from locatable mineral development would have an adverse impact on locatable minerals. Under Alternative B, the greatest number of acres (23,583 acres) would be withdrawn from locatable mineral location and entry, which is less than 1% of BLM-administered lands available to locatable mineral development. Under the No Action Alternative, the second greatest number of acres, approximately 14,282 acres would be recommended for withdrawal. Under Alternatives A, C and D, the BLM would recommend withdrawing 12,786, 13,351, and 12,066 acres from locatable mineral development, respectively.

Impacts of Special Designations Actions on Locatable Minerals

Special designations considered within the RMP include ACECs, WSRs, and WSAs. Previously used special designations include RNAs, SMAs, historic sites, and CRMAs. The designations of RNAs, SMAs, historic sites, and CRMAs would not be used in the new RMP. The areas would be designated as an ACEC or managed without a special designation. ACECs would replace most of the RNAs, SMAs, historic sites, and CRMAs under all action alternatives. WSRs would be recommended as suitable for inclusion in the NWSRS depending on the alternative decisions. WSAs in the planning area are already defined and await Congressional action, so the WSAs would be managed under the non-impairment standard. No wilderness areas exist in the planning area.

It is important to note that if Congress decides not to designate a river segment as part of the NWSRS, the protection management outlined in this section as WSRs would no longer apply. These segments would be managed according to decisions in other sections of the RMP.

Under all alternatives, WSAs would remain open to location and entry under the mining laws but would be managed in accordance with BLM Manual 6330. Mining operations can be authorized by BLM under 43 CFR 3802. Mitigation imposed on mining operations in WSAs would increase the constraints placed on operations. However, no active mining claims exist in the WSAs nor are any locatable mineral operations projected. Further, the total combined acreage under each alternative of the WSAs would be 7,086, which would represent only 0.25% of the total BLM-administered lands (2,784,229 total acres). Presumably, the WSA actions would impact no more than 0.25% of the locatable mineral resource. Only one locatable mineral operation is projected in southwestern Eddy County, however, and the potential for conflict would be unlikely. Since the WSA actions do not impact the availability of land for location and entry and most likely would not affect any locatable mineral operations, the impact on locatable mineral development would be negligible.

If WSAs were not designated as wilderness areas by Congress and were released from WSA status, the lands would be managed as recommended for withdrawal under Alternatives A-C and as open under Alternative D. The impacts of this decision would be negligible because of the small acreage (7,086 acres) included in the WSA lands. The requirement that all WSAs would be managed as VRM Class I areas would have no impact on locatable mineral development. No mining claims or operations exist in the WSAs, and none are projected.

The planning area contains no designated wilderness areas, so no wilderness decisions have been made that would impact locatable mineral development.

Table 4-149 summarizes the locatable mineral allocations in ACECs in the planning area.

Table 4-149. Locatable Mineral Allocations within ACECs, by Alternative (BLM acres)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	82	398,081	406,383	54,689	2,424
Withdrawn	13,434	96,781	154,915	43,959	26,470
Total	***13,516***	***494,862***	***561,298***	***98,648***	***28,894***

Impacts from the No Action Alternative

As shown in Table 4-149, under the No Action Alternative, 82 acres of ACECs would be open for location and entry under the mining laws. This would be 1% of the specially managed areas. Mitigation may be imposed on these lands to prevent unnecessary or undue degradation. Approximately 13,434 acres of land would be recommended to be withdrawn under this alternative. This would be 99% of the special designations.

Under the No Action Alternative, only a segment of the Delaware River would be nominated for inclusion in the NWSRS (Map 2-58). The Black River would not be managed under this system. The acreage of the Delaware River that would be closed for mining claim location and entry would be less than 1% of the total BLM-administered lands.

Impacts from Alternative A

Under Alternative A, 398,081 acres of ACECs would be open for location and entry under the mining laws. This would be 80% of the special designations and less than 1% of BLM-administered lands available to locatable mineral development. Mitigation may be imposed on these lands to prevent unnecessary or undue degradation. Approximately 96,781 acres of land would be recommended to be withdrawn under this alternative. This would be 20% of the special designations and 14% of BLM-administered lands available to locatable mineral development.

Under this alternative, both the Black and Delaware Rivers would be recommended as suitable for inclusion in the NWSRS (Map 2-54). The combined acreage of both river segments would be less than 1% of the total BLM-administered lands.

Impacts from Alternative B

Under Alternative B, 406,383 acres of the special designations would be open for location and entry under the mining laws. This would be 72% of the ACECs and 15% of BLM-administered lands available to locatable mineral development. Mitigation may be imposed on these lands to prevent unnecessary or undue degradation. Approximately 154,915 acres of land would be recommended to be withdrawn under this alternative. This would be 28% of the special designations and 15% of BLM-administered lands available to locatable mineral development.

Under this alternative, the Black River would be recommended as suitable for inclusion in the NWSRS, but the Delaware River would not (Map 2-60). The acreage of the Black River segment would be less than 1% of the total BLM-administered lands.

Impacts from Alternative C

Under Alternative C, 54,689 acres of ACECs would be open for location and entry under the mining laws. This would be 55% of the special designations and 2% of BLM-administered lands available to locatable mineral development. Mitigation may be imposed on these lands to prevent unnecessary or undue degradation. Approximately 43,959 acres of land would be withdrawn under this alternative. This would be 45% of the special designations and 2% of BLM-administered lands available to locatable mineral development.

Under this alternative, the Black River would be recommended as suitable for inclusion in the NWSRS, but the Delaware River would not (Map 2-61). The acreage of the Black River segment would be less than 1% of the total BLM-administered lands.

Impacts from Alternative D

Under Alternative D, 2,424 acres of ACEC areas would be open for location and entry under the mining laws. This would be 8% of the special designations and less than 1% of BLM-administered lands available to locatable mineral development. Approximately 26,470 acres of land would be withdrawn under this alternative. This would be 92% of the special designations and 1% of BLM-administered lands available to locatable mineral development.

Under this alternative, the Black River would be recommended as suitable for inclusion in the NWSRS, but the Delaware River would not (Map 2-62). The acreage of the Black River segment would be less than 1% of the total BLM-administered lands.

Impacts of Visual Resources Actions on Locatable Minerals

VRM Class I and II severely constrain mineral operations, which may lead to increases in the cost to mineral operations. This cost increase can influence the investment decision whether to explore for locatable minerals. VRM Class III and IV would constrain operations, but the constraints would not impact the numbers of operations. None of the VRM classifications would impact the availability of land open to location and entry under the mining laws.

Under all alternatives, the acreage assigned to VRM Class I would be small compared to the overall planning area acreage (Table 4-150 and Table 4-151). Thus, the impact on locatable mineral exploration and development would be negligible. Decisions under Alternatives A and B would result in VRM Class II restrictions on 10% and 13% of BLM-administered lands available to locatable mineral development, respectively. Because only one locatable mineral operation is projected, the results of these decisions would be negligible.

Overall, the impact on locatable mineral exploration and development of VRM decisions under all alternatives would be negligible because no lands would be withdrawn from location and entry under the mining laws and no operations would be precluded.

Table 4-150. VRM Classes on BLM-administered Surface Lands by Alternative (acres)

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205
Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Total	***2,783,858***	***2,783,514***	***2,783,481***	***2,783,558***	***2,783,585***

4.3.1.3 Salable Minerals

4.3.1.3.1 Analysis Methods

Indicators

Salable minerals include common variety minerals and building materials such as sand, gravel, and stone; these are generally widespread, of low unit value, and often used for construction or landscaping materials. Salable mineral development refers to the disposal of salable minerals through a contract of sale or a free-use permit. Salable minerals management applies to salable mineral development on federal mineral estate, including split-estate lands.

The impact indicators used in this analysis that can be used to measure the impacts of management decisions on salable mineral development in the reasonably foreseeable future are:

- acres of BLM-administered lands available for sales and free use of salable minerals;
- number of contracts and permits issued for salable mineral operations; and
- number of salable mineral operations predicted to be opened.

Management land use planning decisions may have a direct impact on and result in an increase or reduction of lands available for salable mineral sales or free use or the number of productive mines.

The primary factor within the alternatives that would affect the public's ability to acquire salable minerals through sale or permit is the amount of constraint the alternative would place on salable mineral development in the planning area; this indicator reflects the availability of federal mineral estate for this type of activity. The amount of constraint on salable mineral development within an area can vary widely. Some areas may be closed to salable mineral development entirely, while other areas may be open to salable mineral development, subject to site-specific NEPA analysis, stipulations, and 43 CFR 3600 regulations. Management for other resources within the planning area can constrain salable mineral development as well. Generally, constraints on salable mineral development would reduce flexibility in where salable minerals can be acquired and increase costs in acquiring these materials.

Methods and Assumptions

The BLM manages salable minerals to make them available for the mineral consumption needs of the nation. In the CFO, this includes caliche, sand, gravel, borrow material, stone, and clay. This section describes potential impacts on the salable minerals resource from management actions for other resources.

This section describes potential impacts on the salable minerals resource in the planning area from BLM management of resources and resource uses under the alternatives. The Salable Minerals section of Chapter 3 describes existing salable minerals resource conditions (see Section 3.3.1.4.3). Actions that limit the acres available for salable mineral development are considered adverse. Actions that increase the acres available for salable mineral development are considered beneficial. In general, the greater the number of acres impacted, the greater the impact on the resource. Other actions may impact the accessibility of the salable minerals resource, and these would likely lead to increased project costs by delaying operations or production during certain times. In the extreme example that a number of such limitations resulted in such high projects costs that the project would became uneconomic. In this case, the acreage would still be available, but development would be severely constrained.

Impact analyses and conclusions are based on interdisciplinary team knowledge of the resources and the planning area, information provided by BLM experts or experts from other agencies, and information in pertinent existing literature. The analyses described in this chapter represent the best estimates of impacts because exact locations of development or management often are not known. Effects are quantified to the extent practical based on available data. In the absence of quantitative data, best professional judgment was the basis for the analysis. Effects are sometimes described using ranges of potential impacts or in qualitative terms.

The amount of constraint on salable mineral development in each alternative was quantified through a GIS analysis of the salable mineral allocations and management actions. In this analysis, each land management decision was analyzed for its impact on salable mineral development, as measured by lands available for issuance of contracts and permits, the numbers of contracts and permits, and the numbers of operations affected. Impacts were quantified by comparing the amount of affected land with the total amount of available land. The assumption was used that the percentage of land affected by a specific decision is directly proportional to the amount of resource affected by that decision. For example, if a decision affected 10% of the total available BLM-administered surface lands, then it presumably affected 10% of the mineral resources on that land and 10% of the operations that would be used to develop that resource. Similarly, if a decision would affect 10% of the BLM-administered subsurface estate available to leasable mineral development, then it would affect 10% of the salable operations on split estate lands.

The following assumptions were used to conduct the impact analysis for salable minerals:

- The potential for occurrence of salable minerals exists across almost the entire planning area. However, the occurrence of a salable mineral does not imply that the mineral can be economically developed. Mineral occurrence potential includes both exploitable and potentially exploitable occurrences.
- Any alternative that limits salable minerals activities or acres would have an adverse impact on the potential exploration and development of salable minerals.
- Restrictions on salable minerals activities apply for the duration of the planning period. However, there could be changes through RMP amendments or changes in regulations.
- The disposal of salable mineral resources is discretionary.
- The average number of contracts and permits per year in the CFO based on 2011 to 2013 data is about 574. As of 2015, 287 separate operations are ongoing on BLM-administered lands in the planning area, which is equivalent to 50% of the number of contracts and permits. Since the demand for salable minerals predominantly parallels the oil and gas activity in the planning area, the numbers of salable contracts and permits and numbers of operations would parallel oil and gas development. Based on the RFD scenario, it is assumed that oil and gas development for the life of the plan would remain at least static. Thus, both the numbers of salable mineral contracts and permits processed each year and numbers of operations are assumed to remain about the same each year for the planning period.
- Most of the oil and gas activity and attendant salable mineral operations are in Eddy and Lea Counties. In those counties, the salable mineral operations are relatively evenly distributed on BLM-administered lands. Thus, for purposes of this analysis, the distribution of salable pits and quarries was assumed to be evenly scattered throughout the CFO planning area (see mineral material site Map 3-15) where most of the salable mineral development has taken place. This relationship is less true for BLM-administered lands in Chaves County; however, many of the restrictions on salable mineral development do not apply to Chaves County. Thus, for this analysis, the assumption that the number of contracts and permits per acre are evenly distributed throughout the planning area. In addition, for any given acre, any of the salable mineral commodities could be economically produced and marketed (i.e., caliche, sand, gravel, borrow, building stone, or clay).
- Some salable mineral management decisions cannot be quantified. In these cases, impacts are characterized as increasing or decreasing the amount of constraint on salable mineral development.

Management Actions with No Impacts or Minor Impacts on Salable Minerals

This section briefly addresses management actions would have either minor or no impacts on salable minerals. A brief explanation of the rationale in determining minor or no impact is presented, and the management actions are not carried forward for detailed analysis in the salable minerals subsection.

Air Resources

Requirements under all alternatives for diesel engine emission standards (EPA Tier 4 Nonroad Diesel Engine Emission Standards or equivalent for specific oil and gas production operations) to control fossil fuel emissions, and daily watering of construction areas to control fugitive dust would increase the constraints placed on salable mineral operations. Most likely, no operations would be curtailed because of the air quality requirements.

Backcountry Byways

When Backcountry byways and national recreation trails are designated in the future, they may overlap with existing or planned salable mineral operations. Existing operations would not be impacted; however, mitigation requirements would most likely be imposed on the operations that postdate the backcountry byway designations. It is not anticipated that the conditions would not preclude the salable mineral development under any of the alternatives.

Cultural Resources

Conflicts between salable mineral development and cultural resources would be resolved in accordance with regulations, policy, and the Permian Basin Programmatic Agreement between the SHPO and the BLM, including consultation with tribes concerning mineral development. Some policies may cause minor delay in salable mineral development, but the delays would be minor and would not reduce the land available for location or the number of salable mineral operations.

Cultural resource surveys and consultation would increase the operation costs of salable mineral operations; however, salable mineral development proponents routinely include this cost while making investment decisions. Conducting surveys prior to any surface-disturbing activities tends to delay those activities, which increases the costs of operations. However, the delays are typically temporary, and the costs would be minimal compared to other operations costs.

Leasable Minerals

The locations of wells or existing solid leasable mineral operations may conflict with the location of salable mineral deposits. Therefore, development of leasable minerals could have a direct adverse impact on salable mineral development. However, in practice, the salable mineral deposits, primarily caliche, are widespread in the oil and gas fields. Therefore, salable mineral operations can often avoid location conflicts and vice versa. Overall, leasable mineral development would not result in the loss or reduction of land acreage available for salable mineral development although it may be fragmented. The number of contracts and permits would not likely be impacted by leasable mineral development.

Livestock Grazing

The standards for rangeland health would apply to reclamation of all salable minerals operations in the planning area; however, these standards would not significantly increase the constraints placed on salable mineral operations or impact lands available for contracts or permits.

Locatable Minerals Actions

The only impacts of locatable mineral development on salable mineral development would be the conflict from existing and projected mines. Only one locatable mine exists in the planning area, and no additional mines are projected during the planning period. Ample salable mineral resources occur elsewhere in the vicinity of the one producing mine, so a conflict with location is unlikely. Thus, locatable mineral actions have no impact on salable mineral development.

Paleontological Resources

There are no paleontological resources management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Public Health and Safety

Salable mineral operations already are required to follow all safety regulations and policies, including OSHA and MSHA rules. Management actions to enforce rules have no impact on salable mineral development. Also, development of health and safety databases and monitoring has no impact on salable mineral development. Thus, health and safety decisions have no impact on salable minerals development.

Renewable Energy

Solar and wind projects would encompass significant acreage in the planning area. The wind resource maps (Map 3-28) show that most of the wind potential is in the Guadalupe Mountains. Solar resource maps illustrate that solar projects could be located throughout the planning area, although solar projects would most likely be situated near existing transmission corridors. Locations of both wind and solar projects could conflict with salable mineral deposits; however, ample supplies of salable minerals occur throughout the planning area. Additionally, few deposits have been developed in the Guadalupe Mountains where wind projects are likely. Thus, the chances of location conflicts with wind and solar energy projects would be minimal. The renewable energy sector would require salable minerals for road and well pad construction and for concrete. Therefore, a few existing deposits of salable minerals would be mined to meet these needs of any new renewable energy developments in the planning area.

Travel Management

Implementation of a comprehensive travel management plan would have a beneficial effect on salable mineral development because it would identify roads that would be available for access up front so these routes can be projected during the operation planning phase. The travel management plan would have no impact on the availability of land for salable mineral development or the number of contracts or permits available for salable minerals.

Limiting cross-country travel by motorized vehicles except travel related to a lease or permit would have a beneficial effect for salable mineral development because it would limit the amount of public traffic in the vicinity of facilities and mining operations, which would be a safety concern for salable mineral operations. This requirement would not impact on the availability of land for salable mineral development, the number of contracts or permits, or the number of salable mineral operations.

Travel management decisions can impact salable mineral development because access roads for exploration and development can be closed or their use limited temporarily. These actions can impact access to mineral deposits or limit the type of vehicular traffic, which can constrain salable mineral operations. However, typically haulage routes would coincide with existing roadways, and access roads and haul roads would be authorized under the contract or permit. Furthermore, the areas closed to travel under each alternative are small in comparison to the size of the planning area (Table 4-151).

Table 4-151. Travel Management Decisions, by Alternative (acres)

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Vegetation Management

There are no vegetation management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Water Resources

There are no water resources management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Wildland Fire Management

There are no wildland fire management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Cave and Karst Resources

There are no cave and karst management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Riparian Resources

There are no riparian resources management decisions considered in Chapter 2 that would impact salable minerals.

Soil Resources

There are no soil resources management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Special Status Species

There are no special status species management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

Wildlife and Fish

There are no wildlife and fish management decisions considered in Chapter 2; therefore, there would be no impact to salable minerals.

4.3.1.3.2 Direct and Indirect Impacts

Impacts of Salable Minerals Actions

Table 4-152 summarizes the salable mineral allocations for BLM-administered lands in the planning area for each alternative.

Table 4-152. Salable Mineral Allocations for BLM-administered Lands, by Alternative (BLM acres)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,637,465	1,160,064	1,121,118	1,784,431	2,028,324
Open with special terms and conditions	–	1,062,192	726,270	752,286	602,621
Closed	146,568	561,995	936,799	247,323	153,174
Total	2,784,033	2,784,251	2,784,186	2,784,041	2,784,119

Impacts from the No Action Alternative

Under this alternative, 2,637,465 acres of BLM-administered lands would be open with standard contract or permit terms and conditions. This would represent 95% of total BLM-administered lands available for salable mineral development. 0 acres would be open with special terms and conditions under this alternative and 146,568 acres of BLM-administered lands would be closed to salable mineral development. Areas closed to salable mineral development would be 5% of the total BLM-administered lands. This would impact about 29 contracts or permits per year or about 14 operations.

Impacts from Alternative A

Under Alternative A, 1,160,064 acres of BLM-administered would be open for salable mineral development under this alternative. This would be 42% of total BLM-administered lands available for salable mineral development. Approximately 1,062,192 acres of BLM-administered lands would be open with special terms and conditions, which is 38% of the total BLM-administered lands. This would have an indirect adverse impact on about 103 contracts or permits.

Under this alternative, 561,995 acres of BLM-administered lands would be closed to salable mineral development, which would be 20% of available lands. This would equate to a decrease of about 75 contracts and permits per year or about 37 operations.

Impacts from Alternative B

Under Alternative B, 1,121,118 acres of BLM-administered lands would be open for salable mineral development with standards terms and conditions. Approximately 726,270 acres of BLM-administered lands would be open with special terms and conditions. This acreage would be 26% of total BLM-administered lands available for salable mineral development with special terms and conditions. Thus, the constraints would impact about 109 contracts or permits per year or about 55 operations.

Approximately 936,799 acres of BLM-administered lands would be closed to salable mineral development. This would be 34% of the total BLM-administered land. Thus, this would impact about 80 contracts or permits per year or about 40 mining operations.

Impacts from Alternative C

Under Alternative C, 1,784,431 acres of BLM-administered lands would be open for salable mineral development with standard contract or permit terms and conditions. Approximately 752,286 acres of BLM-administered lands would be open with special terms and conditions. This acreage would be 27% of BLM-administered lands available for salable mineral development. Thus, the constraints would impact about 86 contracts or permits per year or about 43 operations.

Under this alternative, 247,323 acres of BLM-administered lands would be closed to salable mineral development. This would be 9% of the total BLM-administered land. Thus, this would impact about 52 contracts or permits per year or about 26 mining operations.

Impacts from Alternative D

Under Alternative D, 2,028,324 acres of BLM-administered lands would be open for salable mineral development with standard stipulations and conditions. Approximately 602,621 acres of BLM-administered lands would be open with special terms and conditions. This acreage would be 22% of BLM-administered lands available for salable mineral development. Thus, the constraints would impact about 34 contracts or permits per year or about 17 operations.

Approximately 153,174 acres of BLM-administered lands would be closed to salable mineral development. This would be 6% of the total BLM-administered land. Thus, this would impact about 17 contracts or permits per year or about nine mining operations.

Impacts of Land Tenure Actions on Salable Minerals

Disposal of lands reduces the amount of land available for salable mineral development. If mineral rights are retained, disposal would have no impact on the availability of land for development and, thus, no impact on salable mineral development.

Retention zones include those lands specifically identified by tribes as having special importance related to treaty and/or traditional uses/values; endangered, threatened, proposed, and candidate special status species habitat; NRHP-eligible and -listed properties; wildlife tracts for candidate or special status species; and lands acquired under the LWCF. Although retained lands may be managed with restrictive prescriptions, typically retention of these types of lands would not reduce the amount of land available for salable mineral development

Table 4-153 summarizes the lands identified for disposal and retention, by alternative.

Table 4-153. Land Tenure Actions (acres), by Alternative

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Disposal	218,318	18,703	26,125	31,536	51,579
Retention	1,872,747	2,070,580	2,063,155	2,057,744	2,037,362

Impacts from the No Action Alternative

Under the No Action Alternative, disposal of about 218,318 acres of public land would have a direct adverse impact on salable mineral development because the lands would no longer be available for sales or permits. This would represent about 10% of all BLM-administered lands, so it would preclude about 60 contracts and permits or about 30 operations per year.

Impacts from Alternative A

Under Alternative A, disposal of 18,703 acres of land would have a direct adverse impact on salable mineral development because land disposal would contribute to a reduction in available materials from federal lands if mineral estate were disposed. Lands identified for disposal under Alternative A represent 1% of all BLM-administered lands. If mineral rights are retained during the land disposal process, there would be no impact to salable minerals.

Impacts from Alternative B

Under Alternative B, disposal of 26,125 acres would represent 1% of total BLM-administered lands. This would preclude about seven contracts or four operations per year.

Impacts from Alternative C

Under Alternative C, disposal of 31,536 acres would represent 2% of total BLM-administered lands. This would preclude about eight contracts or four operations per year.

Impacts from Alternative D

Under Alternative D, disposal of 51,579 acres would represent 2% of total BLM-administered lands. This would preclude about 14 contracts or seven operations per year.

Impacts of Land Use Authorizations Actions on Salable Minerals

Land authorization actions include issuance of ROWs for pipe lines, power lines, roads, and sites along with stipulations that govern the operations. The primary land authorization action that impacts mineral development is the decision to designate ROW avoidance and exclusion zones to protect sensitive resources, such as visual resources, cave and karst areas, and special status species. Exclusion or avoidance zones do not preclude mineral development from occurring within the zone. Typically, the conflicts would be avoided by rerouting the ROW around the existing operations. Terms and conditions placed on mineral development ROW grants could increase the costs of future operations if salable mineral development is constrained by the terms. However, multiple use conflicts typically would be resolved through movement of the ROW or relocation mines.

Exclusions and avoidance decisions would have an indirect adverse impact on mineral development depending on how much acreage within the planning area is impacted. Table 4-154 summarizes the ROW avoidance and exclusion zones, by alternative.

Table 4-154. ROW Avoidance and Exclusion Zones Located within the Planning Area by Alternative (BLM acres)

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540
Open	2,051,927	798,544	757,380	1,610,692	1,749,782

Impacts from the No Action Alternative

Utility corridors for major interstate electric transmission, pipeline, and communication lines would be designated in the planning area. Establishment of 479 miles of utility corridors would impact 184,201 acres, which would be 8% of BLM-administered lands available for salable mineral development. Salable mineral operations in these corridors would be avoided or highly constrained, which would increase the costs of operations. This action would impact as many as 33 contracts or permits and 16 operations per year.

Impacts from Alternative A

ROW management areas would be designated as shown on Map 2-48. Under Alternative A, 629,149 acres would be designated as a ROW avoidance zone and 662,038 acres as a ROW exclusion zone. Combined, this would be 62% of the total BLM-administered land, so the corridors would impact as many as 212 salable mineral contracts and 106 permits per year. Salable mineral operations in these areas would be avoided or highly constrained.

Impacts from Alternative B

Under Alternative B, 413,654 acres would be designated as a ROW avoidance zone and 918,701 acres as a ROW exclusion zone. Combined, this would be 64% of the total BLM-administered land, so the corridors would impact as many as 230 salable mineral contracts and 115 operations per year. Salable mineral operations in these areas would be avoided or highly constrained.

Impacts from Alternative C

Under Alternative C, 313,619 acres would be designated as a ROW avoidance zone and 165,378 acres as a ROW exclusion zone. Combined, this would be 23% of the total BLM-administered land, so the corridors would impact as many as 201 salable mineral contracts or permits and 100 operations per year. Salable mineral operations in these areas would be avoided or highly constrained.

Impacts from Alternative D

Under Alternative D, 270,360 acres would be designated as a ROW avoidance zone and 69,540 acres as a ROW exclusion zone. Combined, this would be 16% of the total BLM-administered land, so the corridors would impact as many as 172 salable mineral contracts or permits and 86 operations per year. Salable mineral operations in these areas would be avoided or highly constrained.

Impacts of Lands with Wilderness Characteristics Actions on Salable Minerals

Closing lands with wilderness characteristics to salable mineral development would have an adverse impact to salable minerals. Table 4-155 summarizes the lands with wilderness characteristics identified for management to maintain wilderness characteristics under all alternatives.

Table 4-155. Proposed Lands with Wilderness Characteristics Closed to Salable Development, by Alternative (acres)

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Acres closed	0	66,666	47,611	5,119	1,221
% of BLM-administered lands	0	2.4	1.7	.2	0.05
No. of contracts	3	14	5	3	0.1

Under Alternative A, 66,666 acres would be managed as land with wilderness characteristics and closed to salable mineral development. This would represent 3% of BLM-administered lands available to salable mineral development and would lead to 14 fewer contracts for salable mineral operations. The fewest acres of lands with wilderness characteristics would be closed to salable mineral development under the No Action Alternative. Alternative B would result in 2% of the total BLM-administered lands closed to salable mineral development to manage lands with wilderness characteristics. Alternative C would result in 1% and Alternative D would result in 0.05% of the total BLM-administered lands closed to mineral development to manage lands with wilderness characteristics.

Impacts of Recreation Actions on Salable Minerals

Table 4-156 summarizes the salable mineral allocations for SRMAs and ERMAs in the planning area. Lands in the proposed SRMAs and ERMAs may be open with standard contract and permit terms and conditions, open with moderate mitigation constraints, open but to avoid surface disturbance, and closed to salable minerals development.

Table 4-156. Salable Mineral Allocations for Proposed SRMAs and ERMAs by Alternative (acres)

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open with standard terms and conditions	55,965	9	39	17	7
Open with special terms and conditions	–	36,878	36,878	36,882	36,882
Closed	13,504	13,103	13,073	12,772	12,781
Total	***69,469***	***49,991***	***49,991***	***49,670***	***49,670***

Impacts from the No Action Alternative

Under the No Action Alternative, the total land in the SRMAs and ERMAs open with standard terms and conditions for salable mineral development would be 55,965 acres. Approximately 13,504 acres would be closed to salable mineral development. This would represent 0.5% of the total BLM-administered lands. Because a high percentage of lands would be open with standard terms and conditions, this decision would have a negligible impact on salable mineral development. Note that under this alternative any area that would not be managed as a SRMA would be managed as an ERMA.

Impacts from Alternative A

Under Alternative A, 9 acres within SRMAs and ERMAs would be managed as open with standard contract and permit terms and conditions. The total amount of land open with special terms and conditions would be 36,878 acres, which would represent 1.3% of all BLM-administered lands and 74% of the SRMAs and ERMAs. Thus, the constraints would impact about 46 contracts and 23 operations per year. However, this decision would not preclude development. The total amount of land closed to salable mineral development would be 13,103 acres, which would be 0.5% of the total BLM-administered lands and 74% of the SRMAs and ERMAs.

Impacts from Alternative B

Under Alternative B, the total amount of land open with standard terms and conditions would be 39 acres. The total amount of land open with special terms and conditions would be 36,878 acres, which is the same as Alternative A. The total amount of land closed under this alternative would be 13,073 acres, which would be 1.3% of the total BLM-administered land and 0.5% of the SRMAs and ERMAs. This decision would preclude about 5 contracts and 3 operations per year.

Impacts from Alternative C

Under Alternative C, 17 acres would remain open with standard terms and conditions. Approximately 36,882 acres of the SRMAs and ERMAs would be open with special terms and conditions, which is 1.3% of the total BLM-administered lands and 74% of the SRMAs and ERMAs. The decision would have an

indirect adverse impact on about 46 contracts or permits per year or about 23 operations. The total amount of land closed under this alternative would be 12,772 acres, which would be 0.5% of the total BLM-administered lands and 0.5% of the SRMAs and ERMAs.

Impacts from Alternative D

Under Alternative D, 7 acres would be open with standard terms and conditions. A total of 36,882 acres would be open with special terms and conditions, which is 1.3% of the total BLM-administered lands and 74% of the SRMAs and ERMAs, which represents 11 contracts or permits per year or 6 operations. Under this alternative, 12,781 acres would be closed, which would be less than 0.5% of the total BLM-administered land and 0.5% of the SRMAs and ERMAs.

Impacts of Special Designation Actions on Salable Minerals

Special designations considered within the RMP include ACECs, WSRs, WSAs, and wilderness. Previously used special designations include RNAs, SMAs, historic sites, and CRMAs. The designations of RNAs, SMAs, historic sites, and CRMAs would not be used in the new RMP. The areas would be designated as an ACEC or managed without a special designation. ACECs would replace most of the RNAs, SMAs, historic sites, and CRMAs under all action alternatives. WSRs would be recommended as suitable for inclusion in the NWSRS depending on the alternative decisions. WSAs in the planning area are already defined and await Congressional action, so the WSAs would be managed under the non-impairment standard. No wilderness areas exist in the planning area.

It is important to note that if Congress decides not to designate a river segment as part of the NWSRS, the protection management outlined in this section as WSRs would no longer apply. These segments would be managed according to decisions in other sections of the RMP.

Under all alternatives, WSAs would be closed to salable mineral operations. The total combined acreage under each alternative of the WSAs would be 7,086, which would represent only 0.3% of BLM-administered lands available to salable mineral development. The impacts of this decision would be negligible because of the small acreage included in the WSA lands. If WSAs were not designated as wilderness areas by Congress and were released from WSA status, the lands would be managed as closed to salable development under Alternatives A through C and as open with moderate constraints under Alternative D.

The planning area contains no designated wilderness areas, so no wilderness decisions have been made that would impact salable mineral development.

Table 4-157 summarizes the salable mineral acreage allocations for the proposed ACECs in the planning area, by alternative.

Table 4-157. Salable Mineral Allocations for ACECs by Alternative (acres)

Management Decision	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	822	71,286	64,536	33,973	0
Open with special terms and conditions	–	226,119	198,518	19,766	2,424
Closed	12,613	197,644	298,343	44,824	26,468
Total	***11,080***	***158,551***	***156,869***	***81,130***	***27,224***

Impacts from the No Action Alternative

Under the No Action Alternative, 822 acres of ACECs would be open with standard contract or permit terms and conditions and no lands would be have moderate constraints applied. Approximately 12,613 acres would be closed to salable mineral development. This would represent 0.5% of BLM-administered lands available to salable mineral development. This would have a direct adverse impact on operations and would impact about 17 contracts and permits per year or about eight proposed operations.

Under the No Action Alternative, only a segment of the Delaware River would be nominated for inclusion in the NWSRS (Map 2-58). The acreage of the Delaware River that would be closed for salable mineral development would be less than 1% of the total BLM-administered lands.

Impacts from Alternative A

Under this alternative, 71,286 acres would be open with standard contract or permit terms and conditions; 226,119 acres would be open with special terms and conditions. This would represent 11% of BLM-administered lands available to salable mineral development. These constraints would impact 86 contracts or permits per year or 43 operations. Approximately 8197,644 acres would be closed to salable mineral development, which would be 7% of BLM-administered lands available to salable mineral development. This would translate to a direct adverse impact on about 28 contracts or permits per year or about 14 operations.

The Black and Delaware Rivers would be nominated as WSRs. The Delaware would be managed for VRM Class II. Both designations would have a direct adverse impact on salable mineral development; however, the acreage encompassed by both the Black and Delaware Rivers would be small. Thus, this decision would have a negligible adverse impact on salable mineral development.

Impacts from Alternative B

Under Alternative B, 64,536 acres of land would be open with standard contract or permit terms and conditions and 198,518 acres acreage would be open with special terms and conditions. Approximately 298,343 acres would be closed to salable mineral development, which would be 11% of BLM-administered lands available to salable mineral development. This would translate to 29 contracts or permits per year or about 14 operations.

The Black River would be nominated as a WSR, which would be an adverse impact on salable mineral development because, if designated by Congress, the area would be closed to salable mineral development.

Impacts from Alternative C

Under Alternative C, 33,973 acres would be open with standard contract or permit terms and conditions.

19,766 acres would be open with special terms and conditions. Approximately 44,824 acres would be closed to salable mineral development under this alternative, which would be 2% of the total BLM-administered land. This would translate to 17 contracts or permits per year or about nine operations.

The Black River would be nominated as a WSR, which would be an adverse impact on salable mineral development because, if designated by Congress, the area would be closed to salable mineral development.

Impacts from Alternative D

Under Alternative D, no acreage would be open with standard contract or permit terms and conditions; 2,424 acres would be open with special terms and conditions. Approximately 26,468 acres would be closed to salable mineral development, which would be 1% of the total BLM-administered land.

The Black River would be nominated as a WSR, which would be an adverse impact on salable mineral development because, if designated by Congress, the area would be closed to salable mineral development.

Impacts of Visual Resources Actions on Salable Minerals

Table 4-158 summarizes the VRM classes, by alternative. VRM Class I and II constrain salable mineral operations by placing mitigation measures on mineral development on BLM-administered lands to ensure the activities blend into the surrounding landscape. The costs associated with visual resource mitigation measures in Class I and II areas could influence the decision whether to mine. Under all alternatives, the

acreage assigned to VRM Class I would be small compared to the overall planning area. VRM Class II acreages would be greatest under Alternative B, thereby increasing constraints on the largest number salable mineral operations.

VRM Class III and IV restrictions would not impact the numbers of salable mineral operations, but would still require some mitigation measures to be applied to meet visual resource objectives. VRM Class III and IV acreages are greatest under Alternatives D and C, respectively.

Table 4-158. VRM Management Decisions for BLM-administered Lands by Alternative (acres)

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205
Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Total	***2,783,858***	***2,783,514***	***2,783,481***	***2,783,558***	***2,783,585***

4.3.2 Renewable Energy

The following analysis generally discusses likely reductions in land area available for wind, solar, and geothermal renewable energy as a result of land use allocations. The future development and use of solar, wind, and geothermal resources in the planning area would be driven primarily by the economic viability of developing a particular area. Many areas may be considered unsuitable for renewable energy development because of visual resource impacts, sensitive soil, biological or cultural resources, or other factors for exclusion. Exclusion areas (wind and solar) and closed areas (geothermal) directly remove acreage available for renewable energy development, while avoidance areas may result in the loss of acreage available to development if a proposed renewable energy project results in adverse impacts to other resources and cannot be accommodated in the proposed location. These areas are included in a renewable energy assessment completed in 2009 for all New Mexico BLM-administered land (Ramakka 2009). Most resource use categories, such as air resources, health and safety, oil and gas leasing, livestock grazing, minerals, noxious weeds, cultural resources, wildland fire management, paleontological resources, recreation, travel management, and vegetation management, are unlikely to have any effect on renewable energy development and have been dismissed from further analysis as discussed below. The resources that may impact renewable energy development are listed in Table 4-159.

Currently, no renewable energy projects have been constructed in the planning area. The CFO received a number of applications for potential wind and solar development that were subsequently withdrawn. Several meteorological towers have been erected to evaluate the potential for wind development.

4.3.2.1 Analysis Methods

Renewable energy development, such as wind and solar, would be limited to where transmission corridors are located. Without transmission access renewable energy development is not feasible. Solar resources are generally considered poor throughout the CFO, compared with other regions of the state. Based on the NREL analysis, solar energy resources in the CFO planning area do not appear to be sufficient, unlike in other parts of the state. Annual average direct normal solar resources fall in the range of 6.0 to 6.5 kWh/m^2/day, which may not attract commercial developers (U.S. Department of Energy 2012). As noted, local conditions may be suitable for solar, but an analysis would require adequate collection of meteorological data.

There are few Identified hydrothermal sites and deep enhanced geothermal systems (EGSs) in southeastern New Mexico. NREL maps show the CFO has been designated as least favorable for EGS resources (U.S. Department of Energy 2009).

A similar financial investment is required to develop wind energy. However, NREL analyses indicate that portions of the planning area may have suitable wind resources to attract potential developers (U.S. Department of Energy 1986). Two areas within the planning area have potential for commercial-scale wind development: along the Mescalero Ridge of the Caprock and the area east of the Guadalupe Mountains (Map 3-28). The latter may have limitations because of other management actions as described in this section. The former would have fewer restrictions since it occurs in an area with heavy oil and gas development, where the likelihood of affecting sensitive resources is reduced because it occurs within existing development.

4.3.2.1.1 Indicators

Areas that may be considered for wind and solar development are compared with other management actions in those areas where the renewable resource has potential for development, based on NREL assessments. Because of the lack of specific meteorological data, the effects analysis is based only on CFO acreage where the wind power class rating of good (5) or higher exists.

For solar, the analysis should be based only on planning area acreage where the solar resources potential is 7.0 Kwh/m^2/day. According to the NREL analysis, there are currently no areas in the CFO that meet this minimum criterion.

4.3.2.1.2 Methods and Assumptions

The analysis relies on general NREL assessments of renewable energy potential, but local areas may exceed indicator criteria assigned by NREL at a landscape level. Local areas may be suitable for wind or solar, but would require specific meteorological data be collected to determine whether sufficient resources are present.

The area covered by the CFO is considered least favorable for geothermal energy; however, as with solar energy, locally, EGS resources may be present. Therefore, its development as a resource and relationship with other management actions have been carried through the section.

> The CFO would cooperate with stakeholders to assess local areas for renewable energy in accordance with other management actions and where corridors exist to facilitate energy transmission. Renewable energy development has extensive benefits to the public, but resources must be sufficient to support a commercial operation. Also, transmission must be available or new power lines must be built to distribute the energy.

Management Actions with No Impacts or Minor Impacts on Renewable Energy Development

Air Resources

Air resources would have no adverse impacts on wind, solar, or geothermal energy development. Renewable energy development would not result in emissions that would violate ambient air quality standards. Local dust may be created during construction, but is controlled using water on all construction areas and roads. This would increase the construction cost because of the lack of available water and the need to transport it from potentially distant sources. No further analysis of air resources relative to renewable energy is warranted.

Cultural Resources

Conflicts between renewable energy development and cultural resources would be resolved in accordance with regulations, policy, and the New Mexico BLM Protocol between the New Mexico SHPO and BLM, including consultation with tribes concerning energy development. Some policies may cause minor delay in energy development by requiring surveys to ensure that resources are avoided. Wind and geothermal projects may be less affected than solar projects because of flexibility in siting turbine pads, collection lines, and other infrastructure, which can be located to avoid cultural resource sites. Solar energy requires a larger area and more intensive disturbance, which makes it more difficult to avoid cultural resource sites.

Livestock Grazing

The standards for rangeland health apply to reclamation of renewable energy development; however, these standards would not significantly increase the costs or prohibit the development of energy projects. Livestock grazing is compatible with geothermal and wind development, since a large portion of the range would still be available to cattle. Some areas would be cleared of vegetation, resulting in the loss of grazing acreage. Depending on the extent of these developments, grazing permit numbers may be reduced. Most forage would be removed during the development of solar energy, and commercial solar farms may be extensive. Solar energy development would remove considerably more grazing land than either wind or geothermal development. Livestock grazing would have minor impacts on renewable energy development.

Leasable Minerals

There is no potential for leasable mineral development in the vicinity of the Guadalupe Mountains, where wind resources are favorable. Areas along the Mescalero Ridge may be suitable for oil and gas, which already occurs where wind energy is present. The disturbance and need for access roads make these two developments compatible. Solar and geothermal energy development is not likely to occur in either area. Thus, fluid and solid leasable mineral development would have no impact on wind development.

Solar energy development could occur across Eddy and Lea Counties. However, the solar resources generally do not support large commercial development, and this may create conflicts with mineral development. Should local solar resources be determined to be adequate for development, conflicts with leasable mineral operations could occur. Geothermal development is not likely to occur.

Locatable Minerals

Locatable mineral mining operations could conflict with the location of renewable energy development. However, the low potential for development for locatable mineral deposits and the projection of only one locatable mineral operation during the planning period make the likelihood of conflict very remote. More likely, the two would be compatible because locatable mineral actions would not affect the availability of land for renewable energy, nor would operations conflict.

Paleontological Resources

Surveys for fossil resources would have to be performed prior to surface-disturbing activities, and significant fossils would be identified and mitigated. This would cause delays in permitting and increase the costs of permitting for renewable energy projects, but the delays would be minor and the costs minimal. None of the paleontological resources decisions would likely impact the amount of land available for renewable energy development. Thus, no further analysis is needed.

Public Health and Safety

Renewable energy development and operations already are required to follow all safety regulations and policies, including OSHA. Open-loop geothermal energy projects may emit hydrogen sulfide and other gases as steam is released (Kagel 2008). This may cause a health risk for workers who work in close proximity to the facility. A small amount of mercury may also be produced, requiring expensive filter technology. Closed-loop systems pose no additional health or safety issues.

Construction and operation of renewable energy projects are not likely to pose safety and health issues that are not already addressed in mining and oil and gas development. Thus, no further analysis is needed.

Salable Minerals

As with other mineral resources, there may be minor or rare conflicts over location with renewable energy development, but the two are generally compatible. The addition of roads and the need for transmission might be shared and therefore present a positive relationship. Thus, salable mineral decisions would have no effect on renewable energy development, and no further analysis is warranted.

Travel Management

Implementation of a comprehensive travel management plan would have a minor impact on renewable energy development. Identifying roads that would be available for access might have a beneficial effect on renewable energy development, such that costs for road improvement can be estimated. However, the closure of roads might exclude some areas from development.

Typically, only very primitive roads would be closed to access, whereas more established routes that would likely be used for renewable energy development would remain open. Improvement of more remote roads to accommodate large trucks for transporting wind turbines, for example, would be costly and not likely cost effective for anything but the largest commercial development. Since transmission is not likely to be present or permitted, use of these remote roads for renewable development is also unlikely. Furthermore, the areas closed to travel under each alternative are small, compared with the size of the planning area (Table 4-159). Thus, travel management decisions would have a minor effect on renewable energy development. No further analysis is warranted.

Vegetation Management, Including Noxious Weeds

Vegetation management decisions under all alternatives focus on maintaining and restoring desired plant communities to rangeland health standards for the protection of watersheds and plant and wildlife habitat. The impact on habitat loss or modification from wind and geothermal is minimal, compared with the total acreage in the CFO. Except for the small area occupied by pads/turbines and roads, collection lines and other disturbance for wind energy is temporary, and restoration of native plant communities is completed following the construction period. Solar development results in a greater area of disturbance. But under all alternatives, lease stipulations, COAs, and BMPs would be applied to restore native plant communities and control the spread of noxious weeds. Thus, vegetation management decisions would have no impact on renewable energy development. No further analysis is needed.

Water Resources

Water resources management decisions would focus on protection of surface water and groundwater quality from the impacts of renewable energy development. Although solar energy may require surface water or groundwater during operation, the development is unlikely to affect surface water or groundwater quality. Lack of water availability would limit where solar energy could be developed. Wind energy development would require little water and would have no impacts to surface water or groundwater quality. Geothermal development uses groundwater that may have high levels of minerals. However, the pumping system usually employs a closed-loop system that prevents extracted water from being released. Some water is released as steam, but it poses no threat to water quality. No water contamination from geothermal sites has been reported in the United States (NREL 2012). The availability of water would limit where geothermal energy could be developed.

Wildland Fire Management

Fire suppression strategies and management of fuels would have a beneficial effect on renewable energy development by reducing the danger of wildfires that could damage expensive technology. Wildland fire management actions would not impact the land available for renewable energy projects. Thus, no further analysis is needed.

Direct and Indirect Impacts

Direct impacts to renewable energy include management actions permitting or prohibiting renewable energy development (see Table 4-159). Market demand and availability of the resource would ultimately drive the development of renewables in the planning area in areas where renewable energy development is allowed. Indirect beneficial impacts to renewable energy sources include management actions for other resources and resources uses that would encourage or facilitate renewable energy development. These would include transmission ROWs.

Indirect adverse impacts include management actions constraining renewable energy development such as sensitive habitat or species, visual resources, and lands and realty. Other indirect impacts of wind would include habitat loss, but to a lesser degree than solar development. For example, some recreation, grazing, wildlife, and other management actions may not be as restrictive regarding wind development since there is less habitat disturbance and fewer access restrictions than for solar development. Direct effects include the mortality of birds and bats from the wind development operation, and in some cases from the presence of solar farms. Locations of sensitive bird and/or bat species could restrict wind development. Indirect impacts to LPC occur through the placement of tall structures that may cause LPC to abandon breeding sites. Transmission lines that accompany energy would have a similar effect. Therefore, restrictions on energy ROW corridors would limit where solar and wind energy resources could be developed. Road improvements needed for both wind and solar development could result in habitat fragmentation and further impact sensitive species. The existence of cave/karst areas may also restrict renewable energy development, especially for the construction of heavy turbines, which may be threatened from potentially unstable geology. Erodible soils would also limit some renewable energy development, especially solar, because the large extent of vegetation removal would make soil resources vulnerable to erosion. However, solar projects are generally built on level terrain and include soil stabilization.

Geothermal energy developments result in surface disturbance similar to oil and gas extraction. Numerous roads and pipelines would result in indirect impacts through habitat loss and fragmentation. This energy development would have restrictions from other management actions that are similar to those for oil and gas.

Vegetation

Direct and indirect impacts from management actions may vary by renewable resource. For example, solar projects are generally incompatible with other management since the development consumes considerable acreage by a single use. This intense development results in almost complete loss of habitat from the clearing and shade created by solar panels. Therefore, other management concerns, such as impacts to vegetation (loss) causing indirect effects on wildlife and direct effects on wildlife as a result of potential mortality, would restrict this development.

Special Status Species

The location of occupied habitat by special status species would have considerable influence on where renewable energy could be developed. Renewable energy development requires land disturbance that could result in long-term displacement of rare species.

Because of the sensitivity of LPCs to vertical structures, a greater buffer would be required for turbine placement and transmission lines associated with energy projects. The Western Association of Fish and Wildlife Agencies' Range-wide Conservation Plan for the LPC has established a minimum 1.25-mile buffer distance from active leks. Future areas for population expansion, as designated by the LPC Southern Great Plains Crucial Habitat Assessment Tool, for example, could also be restricted from renewable energy development, since that habitat may be critical in future recovery of the species. Lek surveys and additional habitat analysis may be required for any renewable energy or related transmission projects that overlap LPC Southern Great Plains Crucial Habitat Assessment Tool categories. Poor placement of such infrastructure could have a direct impact on LPC by causing abandonment of breeding sites.

Direct mortality from collisions with solar panels and wind turbines are possible, more so for the latter. Consequently, movement of birds, such as during migration, must also be considered for locating projects relative to the occurrence of these species.

Solar projects require considerable land clearing; therefore, habitat fragmentation must be considered for development within or near special status species' habitat. Habitat fragmentation may have an indirect impact by preventing special status species from expanding their range. For example, development of habitat between areas occupied by DSL may restrict population expansion to other potential occupied habitat.

Aplomado falcons may fly into the rotor-swept area of wind turbines, increasing the potential for fatalities. Therefore, the presence of these birds could restrict the development of wind in breeding areas and also in areas where the birds hunt.

Gypsum wild buckwheat occurs in specialized habitat that is rare, and conflicts with energy development are less likely. Surveys for Kuenzler's hedgehog cactus and Lee's pincushion cactus should determine whether they are present in a potential energy development area. Wind development, with its low surface area disturbance, may be more compatible than solar development with special status plant species, since populations can be more easily avoided in project planning and construction.

Recreation

Restrictions from recreation may occur because areas open to hunting, hiking, bird watching, and other types of recreation would be incompatible with solar development since it requires clearing of habitat and fencing, which would restrict access.

Water Resources (Quantity)

Although renewable energy has little impact on water quality, certain types of solar development require substantial water resources, which may impact this resource quantity and limit suitability of locations as a result of competition for limited water resources. Concentrated solar thermal plants using cooling towers can use as much as 600 to 650 gallons of water per megawatt hour (U.S. Department of Energy 2012). Photovoltaic solar systems require water only for cleaning of the panels. Therefore, desert aquifers, springs, seeps, and other aquatic systems could be impacted from the withdrawal of water.

Backcountry Byways

Designations of backcountry byways would have a direct impact on renewables development because of the level of planning required to implement adequate buffer zones to prevent energy development from being visible. Those using byways would expect a natural level of experience that could be impaired by the presence of renewable energy projects. Therefore, additional visual analysis would be required of wind energy projects relative to the location of byways.

Visual Resources

The three types of renewable energy may have different impacts or restrictions from visual resources. The indirect impacts of wind energy development are less restrictive. However, wind turbines are highly visible from great distances in relatively flat terrain, particularly if the project is placed on ridges or caprock. Therefore, management of important visual resources can effectively preclude wind development in some areas (typically areas managed as VRM Class I and II). It is assumed that VRM Class I and II would restrict all renewable energy, but wind projects may also result in visual impairment for either class if built in a Class III area. Even in the latter, it may be difficult to maintain a moderate level of change to the landscape and avoid having wind turbines not dominate the view of the casual observer. As noted in Table 4-159, a specific VRM analysis may be needed for wind projects, even in Class III areas, to determine whether an additional buffer is warranted.

Lands with Wilderness Characteristics

Closing lands with wilderness characteristics to renewable energy development would have a direct adverse impact. Table 4-159 summarizes the lands with wilderness characteristics and WSAs identified for management to maintain wilderness characteristics under all alternatives. Even under the most restrictive alternative, only about 66,666 acres of the planning area would be excluded. To maintain wilderness characteristics, wind and solar development would not be compatible. Geothermal wells could be compatible if directionally drilled to develop the resource in these areas. Wind and solar development would have to be developed outside the lands with wilderness characteristics and would likely need additional analysis to ensure that buffers meet VRM standards and maintain wilderness characteristics.

Table 4-159. Summary of Resource Categories by Alternative that Result in Exclusion, Closure, Avoidance, or Variance of Renewable Energy Development

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Lands with wilderness characteristics	No acres specifically excluded for management of lands with wilderness characteristics.	66,666 acres managed for wilderness characteristics as a priority; 64,535 acres excluded for solar and 66,661 acres excluded for wind	47,611 acres managed for wilderness characteristics as a priority, which include wind exclusions and avoidance areas and solar variance or exclusion areas.	5,119 acres managed for wilderness characteristics as a priority, which include wind exclusions and avoidance areas and solar variance or exclusion areas.	1,221 managed for wilderness characteristics as a priority, which include wind exclusions and avoidance areas and solar variance or exclusion areas.	Excluded to protect wilderness characteristics
WSAs	7,086 acres excluded	7,086 acres excluded	7,086 acres excluded	7,086 acres excluded	7,086 acres excluded	Excluded by law or regulation
Proposed WSRs	No acres specifically excluded for the management of WSRs.	11.9 miles (4,100 acres) excluded	11.9 miles (4,100 acres) excluded	11.9 miles (4,100 acres) excluded	11.9 miles (4,100 acres) excluded	Plan amendments for New Mexico should consider whether a buffer zone is appropriate and, if so, how wide it should be, or what site-specific criteria might be applied to determine variable widths. Geothermal PEIS places a 0.25-mile buffer.
Backcountry byways	85 miles excluded	30 miles excluded	30 miles excluded	30 miles excluded	30 miles excluded	Programmatic plan amendments for New Mexico should consider whether a buffer zone is appropriate and, if so, how wide it should be, or what site-specific criteria might be applied to determine variable widths. Consideration should also be made as to whether exceptions may be made for linear projects that may cross trails.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
ACECs	9,216 acres would be excluded for wind and 3,479 acres would be avoidance for wind. 12,613 acres would be excluded for solar.	423,408 acres would be closed for geothermal and 71,618 acres would be open for geothermal. 410,680 acres would be excluded for wind and 69,275 acres would be open for wind. 410,776 acres would be excluded for solar and 69,178 acres would be variance for solar.	494,594 acres would be closed for geothermal and 66,847 acres would be open for geothermal. 481,251 acres would be excluded for wind, 1,633 acres would be avoidance for wind, and 63,966 acres would be open for wind. 481,895 acres would be excluded for solar and 64,953 acres would be variance for solar.	63,755 acres would be closed for geothermal and 34,815 acres would be open for geothermal. 4,657 acres would be excluded for wind, 14,563 acres would be avoidance for wind, and 32,493 acres would be open for wind. 63,997 acres would be excluded for solar and 29,627 acres would be variance for solar.	28,022 acres would be closed for geothermal and 871 acres would be open for geothermal. 27,224 acres would be excluded for wind and solar	Most ACECs have management objectives and/or prescriptions that would exclude or be closed to renewable energy development. However, those with prescriptions that would allow new ROWs on a case-by-case basis or new oil and gas development with CSU suggest that some development may be allowed. Where an NSO prescription is applied, present interpretations may allow geothermal leasing under the ACEC, with the resource accessed by directional drilling.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
VRM Class I	7,061 would be excluded for wind and 2 acres would be avoidance for wind. 7,058 acres would be excluded for solar.	37,764 acres would be excluded for wind. 35,645 acres would be excluded for solar and 2,119 acres would be variance for solar.	803 acres would be open for geothermal. 41,289 acres would be excluded for wind and 10 acres would be open for wind. 39,169 acres would be excluded for solar and 2,130 acres would be variance for solar.	7,171 acres would be excluded for wind and 9,450 acres would be avoidance for wind. 7,171 acres would be excluded for solar.	7,171 acres would be excluded for wind. 7,171 acres would be excluded for solar.	–

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
VRM Class II	32,497 acres would be avoidance for wind and 5,122 acres would be open for wind. 37,567 acres would be excluded for solar and 27 acres would be variance for solar.	24,576 would be closed for geothermal. 119,783 acres would be excluded for wind, 73,448 acres would be avoidance for wind, and 15,007 would be open for wind. 191,322 acres would be excluded for solar and 16,119 acres would be variance for solar.	36,148 acres would be closed for geothermal and 7,438 acres would be open for geothermal. 156,248 acres would be excluded for wind, 89,355 acres would be avoidance for wind, and 26,458 acres would be open for wind. 243,124 acres would be excluded for solar and 28,136 acres would be variance for solar.	3,142 acres would be closed for geothermal and 1,426 acres would be open for geothermal. 43,976 acres would be excluded for wind and 2,790 acres would be open for wind. 52,031 would be excluded for solar and 3,382 would be variance for solar.	3,053 acres would be closed for geothermal and 1,355 acres would be open for geothermal. 30,053 acres would be excluded for wind, 1,702 acres would be avoidance for wind, and 4,924 acres would be open for wind. 29,607 acres would be excluded for solar and 5,574 would be variance for solar.	New developments likely excluded except in rare cases. Consideration should be given to additional buffer to prevent visual impairment from wind projects.
Wetlands and riparian areas	7,278 acres excluded	7,278 acres excluded	7,278 acres excluded	7,278 acres excluded	7,278 acres excluded	Leasing of geothermal may be allowed with an NSO stipulation within designated wetland/riparian areas. Transmission lines may be allowed to cross wetland/riparian areas, depending upon results of case-by-case analysis.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Active floodplains	No acres excluded	All acres excluded (wind and solar) or closed (geothermal)	All acres excluded (wind and solar) or closed (geothermal)	All acres excluded (wind and solar) or closed (geothermal)	All acres excluded (wind and solar) or closed (geothermal)	Geothermal programmatic allows leasing in floodplains but requires NSO stipulation. Considering the long-term nature of wind and solar projects, exclusion would appear appropriate for power sites, but transmission lines may be allowed to cross, depending on the specific situation and location of structures such as poles or towers outside of the floodplain.
100-year floodplains	No acres specifically excluded	All acres excluded (wind and solar) or closed (geothermal)	All acres excluded (wind and solar) or closed (geothermal)	All acres excluded (wind and solar) or closed (geothermal)	All acres excluded (wind and solar) or closed (geothermal)	Development may be allowed, provided that adequate mitigation measures are developed. Transmission lines may be allowed to cross, depending on specific situation and location of structures such as poles or towers outside the floodplain.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Aplomado falcon	40,656 acres of Level I aplomado falcon habitat would be open for geothermal, 35,498 acres of Level II aplomado falcon habitat would be open for geothermal, and 6,303 acres of Level III aplomado falcon habitat would be open for geothermal. 4,626 acres of habitat would be open (variance) for solar and 215,944 acres would be excluded. 80,419 acres of habitat would be open for wind and 139,666 acres would be avoidance area.	10 acres of Level I aplomado falcon habitat would be open for geothermal, 26 acres of Level II aplomado falcon habitat would be open for geothermal, and zero acres of Level III aplomado falcon habitat would be open for geothermal. 12,363 acres of habitat would be open (variance) for solar and 208,202 acres would be excluded. 980 acres of habitat would be open for wind, 22 acres would be avoidance area, and 219,084 acres would be excluded.	10 acres of Level I aplomado falcon habitat would be open for geothermal, 26 acres of Level II aplomado falcon habitat would be open for geothermal, and zero acres of Level III aplomado falcon habitat would be open for geothermal. 12,363 acres of habitat would be open (variance) for solar and 208,202 acres would be excluded. 980 acres of habitat would be open for wind, 22 acres would be avoidance area, and 219,084 acres would be excluded.	97,329 acres of Level I aplomado falcon habitat would be open for geothermal, 657 acres of Level II aplomado falcon habitat would be open for geothermal, and zero acres of Level III aplomado falcon habitat would be open for geothermal. 16,348 acres of habitat would be open (variance) for solar and 204,113 acres would be excluded. 976 acres of habitat would be open for wind and 219,004 acres would be avoidance area.	97,345 acres of Level I aplomado falcon habitat would be open for geothermal, 1,188 acres of Level II aplomado falcon habitat would be open for geothermal, and zero acres of Level III aplomado falcon habitat would be open for geothermal. 16,445 acres of habitat would be open (variance) for solar and 204,019 acres would be excluded. 16,244 acres of habitat would be open for wind and 203,724 acres would be avoidance area.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Pecos bluntnose shiner	73 acres of habitat would be avoidance area for wind.	21 acres of habitat would be closed for geothermal. 92 acres of habitat would be excluded for solar. 73 acres of habitat would be excluded for wind.	21 acres of habitat would be closed for geothermal. 4 acres of habitat would be open (variance) for solar and 88 acres would be excluded for solar. 73 acres of habitat would be excluded for wind.	21 acres of habitat would be closed for geothermal. 4 acres of habitat would be open (variance) for solar and 88 acres would be excluded for solar. 73 acres of habitat would be excluded for wind.	21 acres of habitat would be closed for geothermal. 4 acres of habitat would be open (variance) for solar and 88 acres would be excluded for solar. 73 acres of habitat would be excluded for wind.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Dune sagebrush lizard	34,824 acres of habitat would be open for geothermal, and 161,483 acres would be closed for geothermal. 584 acres of habitat would be open (variance) for solar and 161,486 acres would be excluded. 148,895 acres of habitat would be open for wind and 13,172 acres would be avoidance area.	152,991 acres of habitat would be open for geothermal, and 43,316 acres would be closed for geothermal. 125,787 acres of habitat would be open (variance) for solar and 36,277 acres would be excluded. 36 acres of habitat would be open for wind, 128,699 acres would be avoidance area, and 33,328 acres would be excluded.	243 acres of habitat would be open for geothermal, and 186,062 acres would be closed for geothermal. 122,653 acres of habitat would be open (variance) for solar and 39,409 acres would be excluded. 870 acres of habitat would be open for wind, 48,284 acres would be avoidance area, and 112,907 acres would be excluded.	152,389 acres of habitat would be open for geothermal, and 43,915 acres would be closed for geothermal. 125,188 acres of habitat would be open (variance) for solar and 36,869 acres would be excluded. 128,138 acres of habitat would be avoidance area for wind and 33,920 acres would be excluded.	152,984 acres of habitat would be open for geothermal, and 43,323 acres would be closed for geothermal. 125,188 acres of habitat would be open (variance) for solar and 36,876 acres would be excluded. 161,271 acres of habitat would be avoidance area for wind and 793 acres would be excluded.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Lesser prairie chicken (LPC)	160,644 acres of isolated population area (IPA) would be open for geothermal, and 469,086 acres would be closed for geothermal.	188,319 acres of occupied range would be open for geothermal, and 112,273 acres would be closed. 616,470 acres of IPA would be open for geothermal, and 13,261 acres would be closed. 270,711 acres of habitat with timing restrictions would be open for geothermal and 135,950 acres would be closed.	22,741 acres of occupied range would be open for geothermal, and 277,850 acres would be closed. 294,947 acres of IPA would be open for geothermal, and 334,740 acres would be closed. 11,045 acres of habitat with timing restrictions would be open for geothermal, and 395,576 acres would be closed.	187,687 acres of occupied range would be open for geothermal, and 112,904 acres would be closed. 614,6123 acres of IPA would be open for geothermal, and 15,107 acres would be closed. 270,077 acres of habitat with timing restrictions would be open for geothermal, and 136,581 acres would be closed.	188,312 acres of occupied range would be open for geothermal, and 112,280 acres would be closed. 13,266 acres of IPA would be open for geothermal, and 616,462 acres would be closed. 135,955 acres of habitat with timing restrictions would be open for geothermal, and 270,704 acres would be closed.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
LPC (continued)	1,023 acres of occupied range would be open (variance) for solar and 204,146 acres would be excluded. 53,760 acres of IPA would be open (variance) for solar and 469,086 acres would be excluded. 276,994 acres of habitat with timing restrictions would be excluded for solar.	150,719 acres of occupied range would be open (variance) for solar and 54,428 acres would be excluded. 509,381 acres of IPA would be open (variance) for solar and 13,258 acres would be excluded. 206,990 acres of habitat with timing restrictions would be open for solar and 69,986 acres would be excluded.	139,962 acres of occupied range would be open (variance) for solar and 65,180 acres would be excluded. 485,316 acres of IPA would be open (variance) for solar and 37,318 acres would be excluded. 197,411 acres of habitat with timing restrictions would be open for solar and 79,559 acres would be excluded.	150,088 acres of occupied range would be open (variance) for solar and 55,053 acres would be excluded. 507,535 acres of IPA would be open (variance) for solar and 15,098 acres would be excluded. 206,359 acres of habitat with timing restrictions would be open for solar and 70,610 acres would be excluded.	150,088 acres of occupied range would be open (variance) for solar and 55,059 acres would be excluded. 507,534 acres of IPA would be open (variance) for solar and 15,105 acres would be excluded. 206,359 acres of habitat with timing restrictions would be open for solar and 70,614 acres would be excluded.	–

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
LPC (continued)	200,804 acres of occupied range would be open for wind and 4,361 acres would be avoidance area. 499,585 acres of IPA would be open and 23,073 acres would be avoidance area. 267,458 acres of habitat with timing restrictions would be open for wind and 9,536 acres would be avoidance area.	1,333 acres of occupied range would be open for wind, 151,427 acres would be avoidance area, and 52,385 acres would be excluded. 153 acres of IPA would be open, 516,350 acres would be avoidance area, and 6,774 acres would be excluded. 387 acres of habitat with timing restrictions would be open for wind, 206,250 acres would be avoidance area, and 70,337 acres would be excluded.	1,319 acres of occupied range would be open for wind, 20,280 acres would be avoidance area, and 183,542 acres would be excluded. 202 acres of IPA would be open, 298,171 acres would be avoidance area, and 224,901 acres would be excluded. 821 acres of habitat with timing restrictions would be avoidance area for wind and 278,148 acres would be excluded.	1,320 acres of occupied range would be open for wind, 150,810 acres would be avoidance area, and 53,009 acres would be excluded. 167,424 acres of IPA would be open, 349,300 acres would be avoidance area, and 6,548 acres would be excluded. 2 acres of habitat with timing restrictions would be open for wind, 206,006 acres would be avoidance area, and 70,961 acres would be excluded.	1,319 acres of occupied range would be open for wind, 197,381 acres would be avoidance area, and 6,447 acres would be excluded. 167,427 acres of IPA would be open, 349,305 acres would be avoidance area, and 6,548 acres would be excluded. 272,217 acres of habitat with timing restrictions would be avoidance area for wind and 4,758 acres would be excluded.	–

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Gypsum wild buckwheat	175 acres of habitat would be excluded for solar and closed to geothermal. 175 acres of habitat would be avoidance area for wind.	0 acres of habitat would be open for geothermal. 38 acres of habitat would be open (variance) for solar and 136 acres would be excluded. 38 acres of habitat would be open for wind and 136 acres would be excluded.	0 acres of habitat would be open for geothermal. 12 acres of habitat would be open (variance) for solar and 163 acres would be excluded. 12 acres of habitat would be open for wind and 163 acres would be excluded.	0 acres of habitat would be open for geothermal. 12 acres of habitat would be open (variance) for solar and 163 acres would be excluded. 12 acres of habitat would be open for wind, 125 acres would be avoidance area, and 38 acres would be excluded.	0 acres of habitat would be open for geothermal. 137 acres of habitat would be open (variance) for solar and 38 acres would be excluded. 136 acres of habitat would be open for wind and 38 acres would be excluded.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Kuenzler's hedgehog cactus	46 acres of habitat would be open (variance) for solar and 53,865 acres would be excluded. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. 1,509 acres of habitat would be open for wind, 49,399 acres would be avoidance area, and 2,985 acres would be excluded. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided.	39,939 acres of habitat would be open for geothermal and 2,884 acres would be closed. 22,930 acres of habitat would be open (variance) for solar and 30,980 acres would be excluded. 21,134 acres of habitat would be open for wind, 1,198 acres would be avoidance area, and 31,579 acres would be excluded.	39,939 acres of habitat would be open for geothermal and 2,869 acres would be closed. 22,930 acres of habitat would be open (variance) for solar and 30,980 acres would be excluded. 21,126 acres of habitat would be open for wind, 1,198 acres would be avoidance area, and 31,587 acres would be excluded.	41,587 acres of habitat would be open for geothermal and 1,226 acres would be closed. 22,994 acres of habitat would be open (variance) for solar and 30,910 acres would be excluded. 21,163 acres of habitat would be open for wind, 11,054 acres would be avoidance area, and 21,652 acres would be excluded.	42,261 acres of habitat would be open for geothermal and 547 acres would be closed. 39,928 acres of habitat would be open (variance) for solar and 13,979 acres would be excluded. 22,951 acres of habitat would be open for wind, 27,284 acres would be avoidance area, and 3,672 acres would be excluded.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
Lee's pincushion cactus	127 acres of habitat would be excluded for solar. 127 acres of habitat would be avoidance area for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	127 acres of habitat would be excluded for solar. 127 acres of habitat would be excluded for wind.	Depending upon species' characteristics and nature of essential primary constituent elements listed for the designated critical habitat as well as results of consultation with FWS, exclusion or avoidance may be appropriate. Depending upon project-specific coordination with the USFWS, habitat areas may be excluded or avoided. Individual review may be necessary to determine whether exclusion or avoidance for specific types of development is most appropriate. The New Mexico Comprehensive Wildlife Conservation Strategy (2006) should be reviewed in coordination with NMDGF as appropriate.

Land Designation	Alternatives					Comments
	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D	
SRMAs and ERMAs	13 acres would be closed for geothermal. 7,887 acres would be excluded for wind and 59,196 acres would be avoidance for wind. 67,083 acres would be excluded for solar.	13 acres would be closed for geothermal and 3 acres would be open for geothermal. 14,552 acres would be excluded for wind, 36,892 acres would be avoidance for wind, and 1,534 acres would be open for wind. 49,539 acres would be excluded for solar and 2,633 acres would be variance for solar.	117 acres would be closed for geothermal. 26,089 acres would be excluded for wind, 44,846 acres would be avoidance for wind, and 5,631 acres would be open for wind. 67,048 acres would be excluded for solar and 8,714 acres would be variance for solar.	117 acres would be closed for geothermal. 18,289 acres would be excluded for wind, 44,840 acres would be avoidance for wind, and 3,851 acres would be open for wind. 61,556 acres would be excluded for solar and 4,629 acres would be variance for solar.	79 acres would be closed for geothermal and 122 acres would be open for geothermal. 12,691 acres would be excluded for wind, 44,903 acres would be avoidance for wind, and 1,546 acres would be open for wind. 55,466 acres would be excluded for solar and 2,872 acres would be variance for solar.	–
Highly erodible soils	Renewable energy excluded (wind and solar) or closed (geothermal) on 245,854 acres with slopes greater than 10%	Renewable energy excluded (wind and solar) or closed (geothermal) on 245,854 acres with slopes greater than 10%	Renewable energy excluded (wind and solar) or closed (geothermal) on 245,854 acres with slopes greater than 10%	Renewable energy excluded (wind and solar) or closed (geothermal) on 245,854 acres with slopes greater than 10%	Renewable energy excluded (wind and solar) or closed (geothermal) on 245,854 acres with slopes greater than 10%	–

Impacts from Renewable Energy Actions

Applications to permit either solar or wind energy development on public land within the planning area would be considered if the applicant can demonstrate no negative impacts on occupied and suitable LPC or DSL habitat. Programmatic policies and BMPs in the Wind Energy Development Programmatic EIS ROD (BLM 2014) or Solar Energy Development Programmatic EIS (BLM 2012a) would be adopted.

The Solar Programmatic EIS identifies only one solar energy zone in New Mexico, which is in the Las Cruces Field Office planning area. The EIS does not designate any solar energy zones in the CFO planning area. Other areas that are not identified for exclusion would be managed as variance areas that may be available for a utility-scale solar energy ROW with special stipulations or considerations. The BLM would consider ROW applications for utility-scale solar energy development in variance areas on a case-by-case basis based on environmental considerations.

In general, under the No Action Alternative, fewer acres are open to renewable energy development than for any of the action alternatives, especially for geothermal and solar development (Table 4-160). All of the action alternatives have more acreage open to wind development while also excluding more areas to development than the No Action Alternative.

Table 4-160. Renewable Energy Development Management Decisions on BLM-administered Lands

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Geothermal – open	964,322	1,788,890	1,411,281	2,175,070	2,319,907
Solar – variance	271,316	1,323,157	1,257,870	1,356,451	1,460,801
Wind – open	1,134,948	800,762	760,560	1,002,986	1,092,311
Wind – avoid	949,539	624,734	418,812	883,051	926,749
Geothermal – close	1,819,929	995,285	1,372,791	608,850	464,187
Solar – exclude	1,820,409	768,020	833,305	734,636	630,302
Wind – exclude	7,056	666,783	912,860	206,184	73,143

Impacts from Management Common to All Action Alternatives

Wind development would be encouraged in areas where transmission corridors or systems are already located, but it would not be proposed for any exclusion and avoidance areas. Renewable energy would not be impacted for any of the alternatives by state listed species or crucial habitat or for species that are candidates for federal listing. However, some restrictions for the latter could occur through consultation with the USFWS during site-specific analysis.

4.3.3 Livestock Grazing

This section discusses impacts to livestock grazing from management decisions for resources and resource uses discussed in Chapter 2. Existing conditions and trends concerning livestock grazing are described in Chapter 3 (see Section 3.3.3). Impacts to resources and resource uses resulting from implementation of the livestock grazing program are discussed in those particular resource sections of this chapter.

4.3.3.1 Analysis Methods

4.3.3.1.1 Indicators Used to Determine Impacts

- Number of acres of available forage
- Number of available AUMs

4.3.3.1.2 Methods and Assumptions

Management actions related to the following resources and resource uses were analyzed in detail with respect to their impacts to livestock grazing: recreation, minerals, livestock grazing land use authorizations, lands with wilderness characteristics, renewable energy, and special designations. Management actions related to the following resources and resource uses are not expected to result in surface disturbance and would, therefore, neither increase nor decrease the amount of available forage or number of available AUMs across the planning area. Thus, livestock grazing would not be impacted. These are air resources, wildlife and fish, special status species, vegetation, public safety, cultural resources, paleontological resources, visual resources, karst resources, land tenure, and social and economic conditions.

The following are the general assumptions used for assessment under all the alternatives:

- All management decisions would meet the Standards and Guidelines.
- When allotments are not meeting standards or resource objectives, AUMs or grazing systems may be adjusted to improve rangeland health.
- The differences in the amount of AUMs by alternative were calculated by pro-rating the available number of AUMS by the acres open to grazing.

4.3.3.2 Direct and Indirect Impacts

4.3.3.2.1 Impacts of Livestock Grazing Actions

As discussed in Section 3.3.3, Livestock Grazing, the BLM currently manages livestock grazing on approximately 2 million acres. This acreage authorizes 367,656 active AUMs of livestock forage in 265 grazing allotments. These numbers are determined through quantitative field monitoring of vegetative production. Impacts on livestock grazing activities are generally the result of activities that affect the amount of land open to livestock grazing, forage levels and available AUMs, or range improvements that are used to manage grazing systems. Conducting vegetation treatments would likely have the greatest effect on livestock grazing, as such treatments would ultimately increase vegetation production and available forage for livestock. Activities that result in surface disturbance (e.g., mineral development, ROW construction, and recreation) would adversely impact livestock grazing through a reduction in the amount of available forage and number of AUMs.

There would be beneficial and adverse impacts to livestock grazing from the various resource and resource use decisions proposed depending on the specific management actions. Beneficial impacts would result if an increase in the amount of forage and acres available for livestock grazing occurs as a result of management decisions. Any management decisions that minimize surface disturbance would benefit livestock grazing through the preservation and maintenance of native vegetative communities, which would, in turn, contribute to overall rangeland health. In the long term, these management actions would result in an increase in the amount of available forage and the number of available AUMs, although short-term impacts would be adverse as vegetation and available forage is initially reduced and/or treated pastures would not be available for use until rest periods had allowed the area to recover. Adverse impacts would be the result of a decision to close portions of or entire active grazing allotments. Adverse impacts would also result from any use or activity that reduces the amount of available forage or restricts livestock movement and/or access to forage, such as fencing or other types of exclosures. The number of acres open to livestock grazing and number of available AUMs vary by alternative and are represented in Table 4-161 below. This table also summarizes the acres that would be closed to livestock grazing under each alternative considered in this RMP as well as the number of grazing allotments with 1% of the total allotment acreage closed to grazing. A complete list of grazing allotments either partially or completely closed to livestock grazing is provided in Appendix F.

Table 4-161. Comparison of Proposed Livestock Grazing Actions by Alternative

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open (acres)	2,086,107	1,598,198	1,937,725	2,083,232	2,087,759
Closed (acres)*	5,226	493,120	153,583	8,115	3,594
Total	***2,091,333***	***2,091,318***	***2,091,308***	***2,091,347***	***2,091,353***
% Open	***99.7%***	***76.4%***	***92.7%***	***99.6%***	***99.8%***
# of available AUMs (prorated by % of area open to grazing)	***372,519***	***280,965***	***340,656***	***366,229***	***367,024***
# of allotments 100% closed to livestock grazing	***–***	***29***	***1***	***–***	***–***
# of allotments with 1% or more of allotment closed	***2***	***97***	***36***	***10***	***2***

* Closed in this context means that the lands would be unavailable to all forms of grazing.

Per 40 CFR 4110.4-2, when there is a decrease in public land acreage which precludes livestock grazing, the permittees and lessees would be given notification 2 years in advance before the grazing permit, lease, or preference is cancelled, except in cases of emergency. As shown in Table 4-161, each alternative considers a reduction in public land available to livestock grazing, with the greatest number of allotments effected under Alternative A and the least number of allotments effected under the No Action Alternative. More information is provided under the discussion of each alternative below.

Impacts from the No Action Alternative

Under the No Action Alternative, there would be 2,086,107 acres open to livestock grazing and 5,226 acres closed; less than 1% of the entire planning area. No allotments would be 100% closed to livestock grazing under the No Action Alternative, although two allotments would be reduced in size by 1 to 3% of their total size. There would be 372,519 active AUMs available for livestock use across the planning area.

Impacts from Alternative A

Under Alternative A, there would be 1,598,198, acres open to grazing and 280,965 available AUMs. Around 23% of the planning area would be closed to grazing (493,120 acres), resulting in a 23.5% decrease in the amount of available forage and 86,350 fewer available AUMs compared to the No Action Alternative (see Table 4-161). Twenty-nine allotments would be 100% closed to livestock grazing under Alternative A, with 97 allotments being reduced by 1% or more of their total allotment size. Most of these closed acres would come from acreage designated under ACECs and is discussed further in Chapter 2 and in the Special Designations subsection below.

BLM Instruction Memorandum No. 2012-169 states, “The BLM will develop a range of alternatives for an RMP/EIS by varying which lands in the planning area are available for grazing, by varying the amount of forage available for livestock grazing, or both” (BLM 2012d). For this RMP, after consideration of alternative themes and resource conflicts, a range was established that includes a significantly reduced grazing alternative. Alternative A was developed to address watershed management and restoration-related planning issues and given the adverse impacts to watershed health that grazing can incur a significant portion (23.5%) of the planning area was proposed to be closed to grazing in Alternative A. This alternative thereby satisfies Instruction Memorandum No. 2012-169.

Impacts from Alternative B

Under Alternative B, there would be 1,937,725 acres open to grazing and 340,656 available AUMs. Approximately 7% of the planning area (153,583 acres) would be closed to grazing (see Table 4-161).

Under this alternative, an additional 151,644 acres would be closed compared to the No Action Alternative, resulting in a 17% reduction in the amount of available forage and 26,659 fewer available AUMs. One allotment would be 100% closed to livestock grazing under Alternative B, with 36 allotments being reduced by 1% or more of their total allotment size.

Impacts from Alternative C

Under Alternative C, there would be a total of 2,083,232 acres open to grazing (see Table 4-161). As with the No Action Alternative, less than 1% of the planning area would be closed to livestock grazing. No allotments would be 100% closed to livestock grazing under Alternative C and 10 allotments would be reduced by 1% or more of their total allotment size. Adverse impacts to livestock grazing under these this alternative would be comparable to those under the No Action Alternative.

Impacts from Alternative D

Under Alternative D, there would be a total of 2,087,759 acres open to grazing (see Table 4-161). As with the No Action Alternative, less than 1% of the planning area would be closed to livestock grazing. No allotments would be 100% closed to livestock grazing under Alternative D and two allotments would be reduced by 1% or more of their total allotment size. Adverse impacts to livestock grazing under these this alternative would be comparable to those under the No Action Alternative.

4.3.3.2.2 Impacts of Minerals Actions on Livestock Grazing

Mineral development activities, such as the construction of roads, pads, and facilities with caliche surfacing, hydraulic fracturing ponds, and mineral material pits, would result in surface disturbance and the removal of desirable native plant species, as well as alterations in the overall vegetation composition. Soil erosion and spread of invasive species would also potentially increase. Subsequently, these activities would affect the amount of available forage and therefore the number of available AUMs across the planning area.

Alternatives Impacts

Proposed management decisions for many resource programs within the planning area vary by alternative. The potential impacts of these varying decisions are discussed in the following section. The RFD scenario presented surface disturbance projections that would occur in the next 20 years as a result of oil and gas development across the planning area. These vary by alternative and are depicted in Table 4-162.

Table 4-162. The Reasonably Foreseeable Development Scenario of Surface Disturbance in the Planning Area by Alternative for BLM Surface Lands

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total predicted surface disturbance in acres after reclamation	8,636	6,565	5,202	8,575	8,887
Number of AUMs lost	2,071	1,516	1,463	1,725	1,868

Impacts from the No Action Alternative

Under the No Action Alternative, 8,636 acres are predicted for surface disturbance as a result of oil and gas activities across the planning area. This would mean a reduction in the number of acres of available forage representing 2,071 AUMs (see Table 4-162). This forage and the associated AUMs would be unavailable for livestock use from the time surface-disturbing activities occur until reclamation and revegetation are successful.

Impacts from Alternative A

Under Alternative A, 6,565 acres are predicted for surface disturbance, which would translate into 1,516 AUMs that would not be available (see Table 4-162). The nature of impacts to livestock grazing use is the same under Alternative A as under the No Action Alternative because both alternatives would involve the same types of surface-disturbing activities from minerals development. However, under Alternative A there would be approximately 2,071 fewer acres of surface disturbance than under the No Action Alternative, translating into 555 fewer AUMs lost (27% decrease compared to the No Action Alternative).

Impacts from Alternative B

Under Alternative B, 5,202 acres are predicted for surface disturbance, which translates to approximately 608 fewer AUMs lost (30% decrease compared to the No Action Alternative). The magnitude of impacts to livestock grazing under this alternative would be very similar to those associated with Alternative A. Compared to the No Action Alternative, beneficial impacts to livestock grazing would be greater under this alternative due to fewer acres of surface disturbance and greater available forage.

Impacts from Alternatives C and D

Under Alternative C, 8,575 acres are predicted for surface disturbance, which translates to approximately 346 fewer AUMs lost. The number of acres predicted for surface disturbance differs only by about 394 acres (less than 1%) between the No Action Alternative and Alternative C. Under Alternative D, 8,887 acres are predicted for surface disturbance, a difference of only 251 acres (less than 1%) compared to those acres predicted for surface disturbance under the No Action Alternative (see Table 4-162). When compared to the No Action Alternative, the magnitude of impacts to livestock grazing from Alternatives C and D would be similar.

4.3.3.2.3 Impacts of Special Designations on Livestock Grazing

There would be a potential for adverse impacts to livestock grazing where special designations prohibit or restrict grazing within their designated areas and, therefore, reduce the number of acres of available forage and number of AUMs available for livestock grazing use.

Areas of Critical Environmental Concern

The following table shows the number of acres closed to grazing in each ACEC under the alternatives. Those ACECs that do not have any acres proposed for closure to livestock grazing are not included in the table and are the following: Boot Hill District (1,065 acres), Dark Canyon Scenic Area (1,525 acres), Lonesome Ridge (3,021 acres), Serpentine Bends (4,216 acres), Seven Rivers Hills (954 acres) and Six Shooter (735 acres).

Table 4-163. Area of Critical Environmental Concern Acreages Closed to Livestock Grazing

ACECs	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Birds of Prey	0	340,511	1,450	0	0
Pecos Bluntnose Shiner Habitat	0	201	201	201	201
Cave Resources ACEC	0	4,516	4,681	0	0
Carlsbad Chihuahuan Desert Rivers*	0	103,815	62,300	4,896	0
Desert Heronries	0	0	48,474	0	0
Laguna Plata	0	0	4,496	0	0
Maroon Cliffs	0	0	8,659	0	0
Pecos River/ Canyons Complex	0	704	641	638	0
Pope's Well	0	0	81	0	0
Salt Playas	0	0	4,496	0	0
Total acreage closed to livestock grazing	***0***	***449,747***	***130,902***	***5,735***	***201***
Total number of AUMs lost	***0***	***79,180***	***23,047***	***1,009***	***36***

*Total acreage includes those acres in the proposed Gypsum Soils ACEC, which is located within the Carlsbad Chihuahuan Desert Rivers ACEC.

Impacts from the No Action Alternative

Under the No Action Alternative, no acres would be closed to livestock grazing within designated ACECs. Under this alternative, livestock grazing would receive beneficial impacts as a result (see Table 4-163).

Impacts from Alternative A

Under this alternative, a total of 449,747 acres would be closed to livestock grazing within designated ACECs. The magnitude of adverse impacts to livestock grazing would be the greatest under this alternative due to the largest increase in the number of acres closed to grazing compared to the number of closed acres under the No Action Alternative (see Table 4-163). Approximately 79,180 AUMs would not be issued. The amount of available forage and available AUMs would be greatly reduced under this alternative.

Impacts from Alternative B

Under this alternative, 130,902 acres would be closed to livestock grazing within designated ACECs. This would translate into the loss of approximately 23,047 AUMs compared to the zero AUMs lost under the No Action Alternative. The magnitude of impact to livestock grazing would be larger under Alternative B than under the No Action Alternative due to the number of acres closed to grazing under this alternative (see Table 4-163). The amount of available forage and the number of AUMs within designated ACECs would be greatly reduced under this alternative.

Impacts from Alternative C

Under this alternative, 5,735 acres would be closed to grazing within designated ACECs. This would translate to the loss of 1,009 AUMs (see Table 4-163). Under Alternative C, 1,0009 more AUMs would be lost than under the No Action Alternative.

Impacts from Alternative D

Under this alternative, 201 acres would be closed to grazing within designated ACECs. This would translate to the loss of 36 AUMs (see Table 4-163). Under Alternative D, 36 more AUMs would be lost than under the No Action Alternative.

Impacts of Recreation Actions on Livestock Grazing

Livestock grazing would be adversely impacted if proposed recreation decisions prohibited grazing activities and contributed to a decrease in the amount of available forage and available AUMs.

Those acres closed to livestock grazing within each designated SRMA and ERMA varies by alternative and is shown in Table 4-164. The following ERMAs and SRMAs do not have any acres proposed for closure to livestock grazing and, therefore, were not included in the table: Alkali Lake (1,341 acres), La Cueva SRMA (1,564 acres), Square Lake ERMA (6,951 acres), and West Dunes ERMA (624 acres).

Table 4-164. Acres Closed to Grazing within Each Special Recreation Management Area and Extended Recreation Management Area by Alternative

SRMAs and ERMAs	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Black River SRMA	1,275	1,275	1,275	1,275	1,275
Conoco Lake SRMA	0	7	7	7	7
Hackberry Lake SRMA	0	0	255	0	0
Hay Hollow ERMA	0	0	12,911	0	0
Pecos River Corridor SRMA	123	9,094	3,960	520	298
Pecos River Equestrian ERMA	0	0	64	0	0
Total acres closed to grazing	***1,398***	10,376	18,473	1,803	1,581
Total AUMs lost	***246***	***1,826***	***3,252***	***317***	***278***

Impacts from Management Common to All

Conoco Lake SRMA (7 acres) and Red Bluff Reservoir area in the Pecos River Corridor SRMA (120 acres) would be closed to grazing, which would adversely impact livestock grazing, as the amount of available forage would decrease. The Trails RMZ of the Hackberry Lake SRMA, Hay Hollow Equestrian ERMA, and La Cueva SRMA would be open to grazing. This would provide beneficial impacts to livestock grazing through an increase in the amount of available forage.

Impacts from Management Common to All Action Alternatives

There would be no impacts to livestock grazing from proposed decisions under management common to all action alternatives. Decisions listed address camping requirements, specific requirements for rock climbing, and areas designated for interpretation and education activities, all of which would not affect amount of available forage or AUM numbers.

Impacts from the No Action Alternative

Under the No Action Alternative, a total of 1,398 acres within the designated SRMAs and ERMAs would be closed to livestock grazing. The number of available AUMs lost under this alternative would remain 246.

Impacts from Alternative A and Alternative B

Under Alternative A, a total of 10,376 acres would be closed to livestock grazing. Under Alternative B, a total of 18,473 acres would be closed. The magnitude of adverse impacts to livestock grazing would be greater under both of these alternatives, as the amount of available forage would be reduced. Both alternatives would result in approximately 1,000 to 3,000 unavailable AUMs. This would represent a substantial increase from the 246 AUMs unavailable under the No Action Alternative (see Table 4-164).

Impacts from Alternatives C and D

Under Alternative C, a total of 1,803 acres would be closed to livestock grazing. Under Alternative D, 1,581 acres would be closed. Beneficial impacts to livestock grazing would be similar compared to the No Action Alternative because the number of unavailable AUMs would be roughly the same (see Table 4-164).

Impacts of Land Use Authorizations Actions on Livestock Grazing

The designation of ROW corridors on public rangelands would affect the number of acres of forage available for livestock grazing. Livestock grazing would receive long-term adverse impacts from construction and development of ROWs, as amount of available forage would decrease.

Those areas that are classified as ROW avoidance, exclusion, or withdrawal areas would minimize surface disturbances and, therefore, beneficially impact livestock grazing as available forage would increase. The number of acres under each of these categories varies across the alternatives and is depicted in Table 4-165.

Table 4-165. Right-of-way Avoidance, Exclusion, and Withdrawals by Alternative (acres)

Status	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Avoid	30,965	629,149	413,654	313,619	270,360
Exclude	7,056	662,038	918,701	165,378	69,540
Open	2,051,927	798,544	757,380	1,610,692	1,749,782
Total[2]	***2,089,949***	***2,089,731***	***2,089,735***	***2,089,689***	***2,089,682***

Impacts from the No Action Alternative

Under the No Action Alternative, current management pertaining to land use authorizations would continue, as specified in the guidelines in Appendix 2 of the 1997 Carlsbad RMP Amendment. Approximately 184,201 acres, encompassing six ROW corridors, would remain designated for major new utility and transportation facility alignments across the planning area. A total of 30,965 acres, primarily within SMAs, would remain designated as avoidance and 7,056 acres as exclusion areas. Approximately 2,051,927 acres would remain open (see Table 4-165). Adverse impacts to livestock grazing, as those described at the beginning of this section, would potentially continue as ROW applications are granted. Mitigation and remediation actions in place, however, would help minimize these impacts.

Impacts from Alternative A

Under Alternative A, 629,149 acres would be designated as avoidance and 662,038 as exclusion. Approximately 798,544 acres would remain open across the planning area (see Table 4-165). Compared to the No Action Alternative, which proposes 35,063 acres designated as avoidance and 7,056 acres as exclusion areas, the magnitude of and potential for adverse impacts to livestock grazing, as those described above, would be smaller under this alternative, as the amount of available forage would be greater.

Impacts from Alternative B

Under Alternative B 413,654 acres would be designated as avoidance and 918,701 acres as exclusion. Approximately 2,089,735 acres would remain open across the planning area (see Table 4-165). Compared to the No Action Alternative, which proposes 35,063 acres designated as avoidance and 7,056 acres as exclusion areas, the magnitude of and potential for adverse impacts to livestock grazing, as those described above, would be smaller under this alternative, as the amount of available forage would be greater.

Impacts from Alternative C

Under Alternative C, 505,975 acres would be designated as avoidance and 228,642 acres as exclusion. Approximately 1,356,446 acres would remain open across the planning area (see Table 4-165).

Compared to the No Action Alternative, which proposes 35,063 acres designated as avoidance and 7,056 acres as exclusion areas, the magnitude of and potential for adverse impacts to livestock grazing, as those described above, would be smaller under this alternative, as the amount of available forage would be greater.

[2] Note: Total may not sum correctly due to rounding.

Impacts from Alternative D

Under Alternative D, 505,682 acres would be designated as avoidance and 69,610 acres as exclusion. Approximately 1,460,798 acres would remain open across the planning area (see Table 4-165). Compared to the No Action Alternative, which proposes 35,063 acres designated as avoidance and 7,056 acres as exclusion areas, the magnitude of and potential for adverse impacts to livestock grazing, as those described above, would be smaller under this alternative, as the amount of available forage would be greater.

Impacts of Lands with Wilderness Characteristics Actions on Livestock Grazing

Management goals for lands with wilderness characteristics would include maintaining wilderness characteristics as appropriate while also considering the manageability and the context of competing resource demands. Management decisions under lands with wilderness characteristics would adversely impact livestock grazing if they included exclusions to livestock grazing. Managing for wilderness characteristics generally does not preclude livestock grazing, although, as addressed in Section 2.22, Livestock Grazing, there are a few portions of lands with wilderness characteristics units that are closed to livestock grazing within some alternatives. Overall, there are 11 lands with wilderness characteristics units across the planning area, comprising a total of approximately 66,666 acres.

Table 4-166. Acres Closed to Livestock Grazing within Lands with Wilderness Characteristics

Lands with Wilderness Characteristics (total acres = approx. 81,000)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres closed	0	47,488	19,026	0	0
Total available AUMs	0	11,736	11,720	11,721	11,543
Total AUMs lost	0	8,360	3,349	0	0

Impacts from Management Common to All Action Alternatives

Livestock grazing would benefit from various management prescriptions that are common to all action alternatives. These would minimize surface disturbance and contribute to greater forage availability. These would include closures within lands with wilderness characteristics to new road construction, a recommendation for withdrawal from mineral entry, closure to mineral material sales, and restrictions on construction on new structures and facilities.

Impacts from the No Action Alternative and Alternatives C and D

Under the No Action Alternative and Alternatives C and D, 0 acres would be closed to grazing. The current amount of available forage and available AUMs for livestock grazing would be maintained.

Impacts from Alternative A

Under Alternative A, all of the approximately 47,488 acres within lands with wilderness characteristics units would be closed to livestock grazing, thereby imparting reduced beneficial impacts to livestock grazing compared to the No Action Alternative. Livestock would not have access to as much available forage and the number of AUMs lost would increase compared to the No Action Alternative (see Table 4-166).

Impacts from Alternative B

Under this alternative, 19,026 acres would be closed to livestock grazing within four units of lands with wilderness characteristics units. The magnitude of adverse impacts to livestock grazing would be greater under this alternative. Compared to the No Action Alternative, 19,026 additional acres would be closed, translating to the loss of 3,349 unavailable AUMs (see Table 4-166).

Impacts of Renewable Energy on Livestock Grazing

Adverse impacts to livestock grazing would potentially occur in those areas where renewable energy projects that include surface-disturbing activities are allowed. Solar projects would result in direct removal of vegetation created by solar panels. This would potentially have adverse impacts on livestock grazing, as amount of available forage across the planning area would decrease.

Wind energy, comprising the placement of wind turbines, would also result in surface disturbances that could adversely impact livestock grazing through a reduction in amount of available forage.

Impacts from Management Common to All Action Alternatives

Impacts from management decisions common to all action alternatives would include the exclusion of wind and solar, and closure to geothermal development in areas that are within known karst areas. In addition, all action alternatives encourage the placement of wind development projects in areas where transmission corridors are already located and where transmission systems are already in place.

As a result, adverse impacts to livestock grazing would be greatly minimized, as amount of available forage would potentially increase.

Impacts from the No Action Alternative

Under the No Action Alternative, the BLM would close and exclude 1,819,929 acres from geothermal and solar development projects, respectively. Wind development would be excluded from 7,056 acres. Restrictions on the location of solar or wind energy sites would continue to be implemented on specific sites across the planning area, with the majority of the planning area excluded for solar development, as identified by the Solar Energy Development Programmatic EIS ROD (BLM 2012a). Those sites restricted from wind development projects include WSAs, WSRs, VRM Class I and II areas, and areas with known karst occurrences (for complete list of restrictions, see Chapter 2, Alternatives Matrix). Wind energy development would be restricted in designated SMAs to protect sensitive soils. In addition, applications to permit either solar or wind energy sites on public land within the planning area would be considered only if the applicant can demonstrate no negative impacts on avian and bat species. All of these management prescriptions would benefit livestock grazing by minimizing surface disturbance reducing the amount of available forage.

Impacts from Alternative A

Under Alternative A, the BLM would exclude approximately 666,783 acres from wind development, exclude 768,020 acres from solar development, and close 995,285 acres from geothermal development.

Compared to the No Action Alternative, the magnitude of beneficial impacts to livestock grazing would be potentially less because wind energy development would be prohibited on a substantially larger number of acres under this alternative. Though the No Action Alternative prohibits solar development projects on a larger number of acres, the Solar Energy Development Programmatic EIS ROD (BLM 2012a) states most of the planning area would not be suitable to support solar development, thus greater number of acres closed to solar development is irrelevant.

Impacts from Alternative B

Under Alternative B, the BLM would exclude approximately 912,860 acres from wind development. An estimated 833,300 acres would be excluded from solar development and 1,372,791 acres would be closed to geothermal development.

Compared to the No Action Alternative, the magnitude of beneficial impacts to livestock grazing would be potentially greater because wind energy development would be prohibited on a substantially larger number of acres under this alternative.

Impacts from Alternatives C and D

Under Alternative C, the BLM would exclude approximately 206,184 acres from wind development. Under Alternative C, approximately 734,630 acres would be excluded from solar development and 608,850 would be closed to geothermal development. Under Alternative D, 73,143 acres would be excluded from wind development and approximately 630,300 acres would be excluded from solar development and 464,187 would be closed to geothermal.

Compared to the No Action Alternative, the magnitude of beneficial impacts to livestock grazing would be potentially greater because wind energy development would be prohibited on a substantially larger number of acres under this alternative.

4.3.4 Travel and Transportation Management

This section analyzes the impacts to BLM travel and transportation management, BLM-maintained travel routes and trails, OHV travel (aka ORV travel) caused by the management actions of other resources and resource uses within the planning area. As discussed in the Chapter 3 Travel and Transportation Management section (see Section 3.3.4), travel management encompasses all forms of transportation within the planning area, including bicycle and motorcycle use, automobiles, trucks, and OHVs. Off-highway vehicles (OHVs) and off-road vehicles (ORVs) are the same under BLM definitions: ORVs are any motorized vehicles capable of, or designed for, travel over land, water, or other natural terrain; OHVs generally include dirt motorcycles, dune buggies, jeeps, four-wheel drive vehicles, sport utility vehicles, over-snow vehicles, and ATVs (all-terrain vehicles) (BLM 2012e). For the purposes of this analysis the term "OHV" is considered synonymous with "ORV."

4.3.4.1 Analysis Methods

4.3.4.1.1 Indicators

The quantitative analysis indicator for travel management is the number of acres of OHV travel categories under the alternatives. These categories are 1) open to unlimited cross-country travel, 2) OHV limited (travel limited to existing or designated routes), and 3) travel routes and trails that are closed to OHV use. The indicator is applicable to the BLM-administered and maintained roads, routes, and trails within the planning area, and determines the degree of travel accessibility and travel opportunities within the planning area.

4.3.4.1.2 Methods

The analysis method for travel management was to compare the changes in acreage for the closed, open, and limited OHV classes for all of the alternatives. Also, non-quantitative management actions were compared for all of the alternatives to determine if they would expand or limit travel opportunities and accessibility within the planning area.

4.3.4.1.3 Assumptions

The travel management analysis assumptions consist of the following:

- Travel routes and trails designated as OHV limited would be beneficial to travel, as these roads, primitive roads, and trails would allow access to areas within the planning area.
- Travel routes designated as closed would be adverse to travel because of the reduced opportunities for access within the planning area.
- For impacts from land use and minerals decisions, an assumption was made that accessible spur roads and access roads would be created for new ROWs, exploratory and production well pads, salable and locatable minerals sites, and hard rock mining sites. These new routes would benefit travel by providing (temporary or long-term) opportunities for travel within the planning area.

4.3.4.2 Resources Eliminated from Further Impacts Analysis

The following resources would have no impacts on travel management or travel opportunities within the planning area and are not analyzed further in this section.

4.3.4.2.1 Impacts of Backcountry Byways on Travel

Under all of the alternatives, the backcountry byway management actions would enhance the existing 55-mile-long Guadalupe Backcountry Byway, which would have no impact on travel accessibility or opportunities.

4.3.4.2.2 Impacts of Cultural Resources on Travel

Under all of the alternatives, cultural management actions would mitigate impacts to cultural sites by creating buffer zones, identifying and gathering data on cultural sites, developing cultural resources management plans, and identifying priority areas for future cultural inventory. These actions would have no impacts on travel within the planning area because they would not, at the programmatic level of resource management, inhibit or expand the opportunities for travel within the planning area.

4.3.4.2.3 Impacts of Health and Safety on Travel

Health and safety management actions for all the alternatives would identify and address mine safety concerns, ensure compliance with toxic and explosive gas protection procedures, monitor and respond to hazardous waste releases, and protect public health and safety. These actions would have no impacts on travel management because they would not close routes, delay, restrict, or otherwise interfere with travel within the planning area.

4.3.4.2.4 Impacts of Livestock Grazing on Travel

Grazing management actions for all alternatives would have no impacts on travel because grazing restrictions and exclusions, and authorized grazing use, within the planning area would not prevent or limit travel.

4.3.4.2.5 Impacts of Paleontology on Travel

Management actions for paleontological resources would have no impacts on travel opportunities because the collection of fossils for personal, commercial, and scientific use, and the protection of these resources would not restrict or expand travel within the planning area.

4.3.4.2.6 Impacts of Recreation on Travel

Management actions for recreation resources would have impacts on OHV travel opportunities and accessibility, but to reduce redundancy in the analysis the reader is referred to the Recreation section (Section 4.3.5). The impacts of management actions on SRMAs and ERMAs pertaining to travel within the planning area are discussed in detail in the Impacts of Recreation Actions on Recreation section.

4.3.4.2.7 Impacts of Soils and Water Resources on Travel

Soils and water resources management actions common to all of the alternatives would have no impacts on travel because none of the management actions that mitigate soil erosion, reclaim disturbed sites in sensitive soils areas, mitigate impacts to surface water and groundwater resources, acquire water rights, and permit water well drilling would restrict access, prohibit travel, or affect travel opportunities within the planning area.

4.3.4.2.8 Impacts of Special Status Species on Travel

Special status species management actions for all of the alternatives would have no impacts on travel because actions under this resource to protect species through designating critical habitat, applying site-specific mitigation, reclaiming habitat, and evaluating areas as potential habitat would not affect travel opportunities and accessibility.

4.3.4.2.9 Impacts of Visual Resources on Travel

There would be no impacts on travel opportunities caused by the proposed VRM actions because VRM class designations and visual resource objectives within the planning area for all the alternatives would be consistent with other land management actions, including travel. There are no specific VRM actions that would restrict or prohibit travel or access within the planning area, beyond those actions already required by law (e.g., restrictions on motorized travel within designated VRM Class I wilderness areas and WSAs).

4.3.4.2.10 Impacts from Management Common to All

As discussed above, the impacts common to all of the alternatives would designate two categories of OHV travel access for all of the BLM-administered public lands within the planning area: OHV limited and closed. The proposed acres within the planning area for each travel category for the No Action and the action alternatives are shown in Table 4-167 and in Maps 2.37 through 2.41 and discussed in Section 3.3.4. Closed areas are locations where travel by vehicle is prohibited. Limited OHV areas are locations where travel is limited to roads and routes already in existence. An existing road or route is defined as "an established road, built or maintained by equipment, which shows no evidence of ever having been closed to vehicular traffic by such means as berms, ripping, scarification, reseeding, fencing, gates, barricades or posted closures. A two-track road would be defined as void of vegetation in the tracks which shows use for other purposes, such as recreation, mining, logging, and ranching, and shows no evidence of ever having been closed to vehicular traffic by such means as berms, reseeding, gating, fencing or signing."

4.3.4.3 Direct and Indirect Impacts

4.3.4.3.1 Impacts of Travel Management Actions on Travel

Table 4-167 summarizes the acreage of travel categories for the No Action and action alternatives (Maps 2.37–2.41).

Table 4-167. Travel Management Decisions by Alternative (acres)

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
OHV limited	2,035,307	2,039,299	2,049,391	2,052,584	2,052,584
Closed	55,966 (2.7)*	52,028 (2.5)	41,936 (2.0)	38,738 (1.9)	38,738 (1.9)
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

*Number in parentheses is the percentage of the total CFO planning area.

Impacts from Management Common to All Action Alternatives

After approval of the revised RMP, management actions under the action alternatives would continue to analyze the impacts of OHV closed and OHV limited for all vehicles within the planning area through adaptive management at the activity planning (project) level. This would be beneficial to travel management in the long-term because travel-related resource use conflicts would be identified and resolved through potential modification of these designated closed, open, and limited routes. A Travel Management Plan would also be developed and implemented after approval of the revised RMP, which would be beneficial to travel in the long-term because it would assist in identifying and resolving travel-related resource use conflicts.

Impacts from the No Action Alternative

As the popularity of travel within the planning area increases and greater numbers of on-road vehicles, OHVs, and visitors use the travel routes within the planning area, travel management issues are and would continue to be a concern (see the discussion of OHV resource use and recreation user conflicts in Chapter 3, Section 3.3.4, and the Recreation section, Section 3.3.5). Under current RMP management actions, these concerns would continue to include engine noise, air pollution from engine exhaust emissions, vehicle impacts on erodible soils, and the production of fugitive dust.

Under this alternative, travel would be managed under OHV limited and closed designations, as shown in Table 4-167 and Map 2-37. Limited access areas would include 2,035,307 acres (97% of the planning area) to protect ACECs, recreation areas, and sensitive resources (e.g., riparian areas, nesting habitat, special status species habitat); and there would be 55,966 acres (3% of the planning area) designated as closed to OHV use to protect resource values, such as critical habitat for threatened or endangered plant, animal, and fish species, cultural sites, and designated non-mechanized scenic recreational areas.

Designated OHV limited areas within 2,035,307 acres (97%) would be beneficial to travel by providing continued, controlled access to the planning area for OHV travel opportunities and access; designated closed areas 55,596 acres (3%) would continue to be adverse to travel in the long term by restricting OHV travel access and travel opportunities in these areas. This alternative would not permit cross-country game retrieval on those areas designated as closed or OHV limited within the planning area, which would be adverse to travel in the long term because accessibility would not be allowed for this type of travel.

Impacts from Alternative A

Under Alternative A, management actions would designate limited OHV use on 2,039,299 acres (97.5%), with 52,028 acres (2.5%) designated as closed to OHV travel (Map 2-38). The impacts on OHV travel would be adverse in the long term in areas designated as closed to travel because travel access and opportunities within these portions of the planning area would not be permitted. The long-term impacts to travel within OHV limited areas would be beneficial for the same reasons as discussed for the No Action Alternative: travel accessibility and opportunities. Compared to the No Action Alternative, this alternative would have more beneficial impacts in the long term on travel access because approximately 4,000 more acres would be designated as OHV limited (a 0.2% area increase from the No Action Alternative), which would provide more travel opportunities within the planning area.

Impacts from Alternative B

Under Alternative B, acreage designated as limited would be 2,049,391 acres (98% of the planning area) for Alternative B (Map 2-39). Alternative B actions would close 41,936 acres (2% of the planning area). This alternative's actions would have the same impacts as those discussed for Alternative A because the areas and percentages of the planning area designated as OHV limited and closed would be similar. Specifically, the differences between Alternative A and Alternative B would be 0.5% more OHV limited travel area than Alternative A. Compared to the No Action Alternative, this alternative would be more beneficial to travel because 14,030 more acres within the planning area would be designated as OHV limited that could provide travel opportunities.

Under Alternative B, big game retrieval management actions and impacts to OHV travel would be the same as discussed for Alternative A.

Impacts from Alternatives C and D

Under Alternatives C and D, management actions would designate 2,052,584 acres (98.1% of the planning area) as OHV limited and 38,738 acres as closed to OHV travel (1.9% of the planning area) (Maps 2.40 and 2.41). The impacts to travel would be the same as Alternative B because the OHV limited and closed acreages are similar. Compared to the No Action Alternative, the impacts of these alternatives would be more beneficial for travel because there would be an increase in travel accessibility: approximately 17,277 more acres would be designated for OHV limited access and travel opportunities than under the No Action Alternative.

Alternatives C and D would permit OHV game retrieval within limited areas within 300 feet of a designated route, primitive road, or trail, which would be beneficial in the long term for this type of travel activity because it would increase accessibility.

4.3.4.3.2 Impacts of Air Resources Actions on Travel Management

Impacts from Management Common to All

Air quality management actions common to all of the alternatives would require compliance with federal and New Mexico air quality standards that include controlling fugitive dust production. BLM policy requires monitoring and managing exhaust emissions and dust production to prevent deterioration of visibility within Class I airsheds (see Air Quality section 4.2.11), which includes the area around Carlsbad Caverns National Park. The impacts on travel within the planning area would be adverse and short term along unpaved road and trails that require road surfacing-related dust abatement measures, because travelers could experience some travel delays or rerouting around the affected road sections during maintenance.

4.3.4.3.3 Impacts of Cave and Karst Resources Actions on Travel Management

Impacts from Management Common to All Action Alternatives

Under all of the action alternatives, the CFO would maintain existing access routes within the proposed Cave Resources ACEC (formerly the Cave Resources SMA). These routes would be maintained in order to prevent new route creation accessibility of the cave and karst resources that would otherwise adversely affect those resources and resources surrounding the cave and karst sites. There would be no impacts to travel because accessibility and travel opportunities would be maintained.

4.3.4.3.4 Impacts of Wildland Fire Management on Travel Management

Impacts from Management Common to All

Under all of the alternatives, fire management actions would have no long-term impacts on travel because prescribed fire treatments, fuels treatments, fire prevention and mitigation, and wildland fire suppression, applicable to all of the alternatives, would not prevent or impede travel within the planning area. There would be short-term adverse impacts to travel opportunities and access if prescribed burns or wildland fires crossed travel routes that required temporary closing or temporary rerouting around the fire management or suppression area for public safety reasons.

4.3.4.3.5 Impacts of Land Tenure Actions on Travel Management

Impacts from Management Common to All

Under all of the alternatives, lands would be acquired through land exchanges, purchases of private and state lands, purchase of land easements, donations, and other means of title transfer if they provide public access to public lands. The impacts would be beneficial in the long term for travel because there would be an increase in travel opportunities and accessibility within the planning area on lands formerly held in private or state ownership. All of the alternatives would be beneficial because of the increased accessibility of the planning area to on-road, OHV, and equestrian travel.

Impacts from Management Common to All Action Alternatives

Under all of the action alternatives, lands would be acquired through land exchanges, land purchases, and donations if they provide public access to public lands. The acquisitions would include, but not be limited to, river access and areas of high recreation value. The impacts would be beneficial in the long term for travel because there would be an increase in travel opportunities and accessibility within the planning area on lands formerly held in private ownership. All of the action alternatives would be beneficial because of the increased accessibility of the planning area to on-road, OHV, and equestrian travel. Compared to the No Action Alternative, the action alternatives would be more beneficial in the long term because specific management actions would be applied to increase the travel opportunities and accessibility of the planning area to on-road, OHV, and equestrian travel.

Impacts from the No Action Alternative

Management actions under the current RMP would set a priority on easement acquisitions on former county roads that have been vacated by the county government when those roads are important for public land management. This would have no impacts on travel management or on travel opportunities within the planning area because access would still be available to travelers.

4.3.4.3.6 Impacts of Land Use Authorization Actions on Travel Management

Impacts from Management Common to All

Under the No Action and action alternatives, management actions would make a reasonable effort to provide travel access to private land owners and public land users if planning area resources are not significantly impacted. This would have a long-term beneficial impact on travel because travel accessibility and opportunities would be expanded into portions of the planning area otherwise restricted to travel.

4.3.4.3.7 Impacts of Minerals Actions on Travel Management

Impacts from Management Common to All

The impacts of minerals resource management decisions on travel would be similar to those discussed above for land tenure and land use authorization actions because the actions are similar. The granting of ROWs and the construction of fluid (oil and gas) and solid leasable, salable, and locatable minerals-related exploration and development roads would be permitted under all of the alternatives. Accordingly, minerals decisions would have beneficial short- and long-term impacts on opportunities for travel and access within the planning area along well pad spur roads, at salable and locatable mineral development sites, and along oil and gas field development roads (see Travel Assumptions above). Hydraulic fracturing has opened new opportunities for oil and gas production, and associated air emissions from construction, drilling, and operations due to the ability to extract oil and gas product in areas previously considered inaccessible or too costly. This increased opportunity for oil and gas development is reflected in the number of wells predicted in the RFD. Truck traffic associated with fracturing operations and horizontal well development may be higher than conventional drilling methods due additional water needs. Potential impacts associated with traffic would be analyzed in site-specific detail at the APD stage.

A summary of the planning area acreages for leasable, salable, and locatable minerals that would allow travel access are shown below in Table 4-168.

Table 4-168. Planning Area Minerals Acreages Available for Travel Access by Alternative

Minerals Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Leasable open	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
Leasable CSU	956,410	799,649	449,759	786,381	631,634
Total open and CSU	***2,555,280 (91.8)****	***1,942,451 (69.8)***	***1,589,240 (57.1)***	***2,537,155 (91.1)***	***2,629,315 (94.4)***
Salable open	2,637,465	1,179,104	1,122,020	1,784,431	2,028,324
Salable open with moderate constraints	–	1,043,152	725,368	752,286	602,621
Total open and with moderate constraints	***2,637,465 (94.7)***	***2,222,256 (79.8)***	***1,847,388 (66.4)***	***2,536,717 (91.1)***	***2,630,945 (94.5)***
Locatable open to mineral entry	2,751,856 (98.8)	2,403,114 (86.3)	2,110,098 (75.8)	2,651,855 (95.2)	2,661,705 (95.6)

* Number in parentheses is the percentage of total BLM planning area, calculated using a total BLM planning area of 2,784,224 acres.

Impacts from Management Common to All Action Alternatives

There are no management actions common to all of the action alternatives that pertain specifically to travel management.

Impacts from the No Action Alternative

Under the No Action Alternative, 92% of the planning area would be available for leasable minerals exploration and development, 95% would be available for salable minerals use, and 99% would be open to locatable minerals development. This would be beneficial in the short term from the construction of temporary minerals-related spur roads and access roads during minerals exploration. Long-term beneficial impacts would be produced by minerals development spur roads and access roads because it would provide OHV travel access and travel opportunities in areas otherwise unavailable to travel.

Impacts from Alternative A

Management actions under Alternative A would permit leasable exploration and surface development on 70% of the planning area. Approximately 80% of the planning area would be open to salable development, and 86% would be available for locatable minerals development. The benefits to OHV travel would be the same as discussed for the No Action Alternative, but to a lesser degree, because 22% fewer leasable minerals acres, 15% fewer salable minerals acres, and 13% fewer locatable minerals acres would be available would be available for travel accessibility and opportunities than under the No Action.

Impacts from Alternative B

Alternative B management actions would allow leasable minerals related surface development on 57% of the planning area. Salable minerals open exploration and development would be allowed on 66% of the planning area, and 76% of the planning area would be open to locatable mineral development.

The benefits to OHV travel would be the same as discussed for the No Action Alternative but to a lesser degree, because 35% fewer leasable minerals acres, 28% fewer salable minerals acres, and 23% fewer locatable minerals acres would be available development that would create opportunities for travel accessibility than under the No Action.

Impacts from Alternative C

Under Alternative C, the area open to leasable minerals development would be 91% of the planning area; the total area open to salable minerals would be 91%, and locatable minerals open areas would total 95% of the planning area. These acreages are similar to those discussed under the No Action Alternative, and would have the same beneficial impacts on planning area OHV travel opportunities and accessibility.

Impacts from Alternative D

Alternative D management actions would maximize the availability of minerals resources for exploration and development. Under this alternative approximately 94% of the planning area would be open to leasable minerals development. The total area open to salable minerals development would be 95% of the planning area, and locatable minerals exploration and development would be allowed on 96% of the planning area. The impacts would be beneficial in the short and long term to OHV travel for the same reasons as discussed under the No Action Alternative: increased accessibility and opportunities for travel within the planning area; however, compared to the No Action Alternative, Alternative D would be more beneficial for OHV travel because more acreage would be available for travel within minerals exploration and development areas.

4.3.4.3.8 Impacts of Lands with Wilderness Characteristics Actions on Travel Management

Impacts from Management Common to All

For all of the alternatives, lands with wilderness characteristics would be managed under three levels of activity (see table below): the protection level would maintain wilderness characteristics; the protection/multiple use level would apply varying degrees of protection or multiple use actions to designated

wilderness characteristics lands. The multiple use level would manage wilderness characteristics lands with an emphasis on a range of uses. Managing designated wilderness characteristics under the multiple use management levels would have beneficial impacts on travel because travel opportunities would become available in these areas. There are no lands designated under the No Action Alternative, so these management levels would have no effect on lands under this alternative.

Impacts from Management Common to All Action Alternatives

Management actions for all of the action alternatives would manage areas for wilderness characteristics, but some units would be protected, some managed for multiple use. The protected areas would be managed to maintain their pristine, undeveloped state under VRM Class I or II objectives. They would be closed to new road construction, and travel routes through them would either be closed or designated as OHV limited. The impacts to travel would be adverse in protected areas in the long term under all of the action alternatives because, while travel opportunities would be available within and through those areas where routes have been proposed, opportunities and access would be reduced or lost in areas where routes would be closed. The impacts to travel in multiple use areas would be beneficial to travel for the reasons mentioned above in Management Common to All Alternatives. Compared to the No Action Alternative, the action alternatives would be more adverse because of the loss of travel opportunities. Table 4-169 summarizes the management levels to travel within the proposed lands with wilderness characteristics.

Table 4-168. Acres of Lands with Wilderness Characteristics by Alternative and Management Level

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	0	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	0	0	18,964	30,595	0
Emphasizes other multiple uses	0	0	0	30,862	65,446
OHV Limited	66,654	66,573	66,575	66,576	66,667
OHV Closed	1	82*	82	82	82

*The acreage numbers do not add up because of variations in mapping shape-files used to determine these areas.

Impacts from the No Action Alternative

Under current management actions, none of the planning area would be managed to preserve wilderness characteristics. Planning area travel opportunities and accessibility would continue to be available along routes designated as OHV limited. There would be no impacts on travel because current accessibility along OHV routes would remain for planning area travelers.

Impacts from Alternatives A to D

Under Action Alternatives A, 82 acres would be adversely closed to OHV travel opportunities. Compared to the No Action Alternative, travel management impacts under this alternative would be adverse in the long term because OHV travel opportunities and accessibility would be more restricted to preserve wilderness characteristics.

4.3.4.3.9 Impacts of Noxious Weeds and Vegetation Actions on Travel Management

Impacts from Management Common to All

The short- and long-term impacts of noxious weeds and vegetation treatments for exotic vegetation control and for ecosystem restoration would be the same as those discussed under Section 4.2.6, Wildland Fire Management Action Impacts on Travel. Herbicide and pesticide treatments, mechanical treatments, and controlled fire treatments near or adjacent to travel routes may require temporary or short-term closures or rerouting around treatment areas for safety reasons to protect public health.

4.3.4.3.10 Impacts of Renewable Energy Actions on Travel Management

Impacts from Management Common to All

Under all of the alternatives, the programmatic policies and BMPs in the Wind Energy Development Programmatic EIS ROD (BLM 2014) and the Solar Energy Development Programmatic EIS ROD (BLM 2012a) would be adopted. To ensure public health and safety, sites developed for solar and wind energy collection and transmission would be appropriately fenced to restrict public access during construction and operations. The impacts to travel within the planning area under all of the alternatives would be adverse in the long term because travel opportunities would be restricted within these sites.

4.3.4.3.11 Impacts of Riparian Actions on Travel Management

Impacts from Management Common to All

There are no management actions common to all alternatives that pertain to travel management.

Impacts from Management Common to All Action Alternatives

There are no management actions common to all of the action alternatives that are relevant to travel management.

Impacts from the No Action Alternative, Alternative A, and Alternative B

Under current management, Alternative A, and Alternative B seeps and springs in the planning area would be closed to OHV travel. Management actions under these alternatives would have long-term adverse impacts on travel from closing these riparian areas to vehicle traffic and reducing planning area travel opportunities and accessibility.

Impacts from Alternative C

Under Alternative C, OHV travel in and adjacent to planning area seeps and springs would be OHV limited or BLM administrative use only. This action would have long-term adverse impacts on travel because travel accessibility and opportunities would not be available in these areas. The impacts would be the same as discussed for the No Action Alternative.

Impacts from Alternative D

Alternative D would not apply any specific restrictions to travel within riparian areas, except that no surface disturbances would be allowed within seep and spring areas. The impacts would be the same as the No Action Alternative for the same reasons.

4.3.4.3.12 Impacts of ACECs and Special Designations Lands Actions on Travel Management

Impacts from management actions for all of the alternatives related to OHV travel access and travel opportunities within ACECs, WSAs, and along recommended eligible WSR segments are analyzed under the Recreation Actions on Recreation section, the ACEC actions on Recreation section, in the WSA Actions on Recreation section, and in the WSR Actions on Recreation section. These recreation subsections discuss in detail the impacts to travel accessibility and opportunities for OHV use and on-road use.

4.3.4.3.13 Impacts of Wildlife and Fish Actions on Travel Management

Impacts from Management Common to All

There are no management actions common to all of the alternatives that are specifically related to travel management.

Impacts from Management Common to All Action Alternatives

There are no management actions common to all of the action alternatives that are specifically related to travel management.

Impacts from the No Action Alternative

Under this alternative, the 349,355-acre Birds of Prey Grasslands (not managed as an ACEC under the No Action Alternative) would be OHV limited throughout the area. There would be no impact to travel because travel opportunities and access would continue to be available.

Impacts from Alternatives A to D

Management actions under Alternatives A, B, C, and D would restrict travel opportunities to OHV limited within the proposed Birds of Prey Grasslands ACEC to protect wildlife species. The long term beneficial impacts to travel would be the same as discussed under the No Action Alternative because travel accessibility and travel opportunities within the 349,355-acre area would be the same. While Alternatives C and D would not designate the area as an ACEC, this land status would have no impact on travel accessibility and opportunities.

4.3.5 Recreation and Visitor Services

This section analyzes impacts to recreation resources and user experiences from management actions discussed in Chapter 2. Current activities, existing conditions, and trends for recreation are discussed in Chapter 3 (see Section 3.3.5). The analysis indicators, assumptions, and methods described below were used to analyze the level of impacts the proposed RMP management actions would have on recreation resources, opportunities, recreation expectations, and the likelihood for recreation user satisfaction. The terms “recreation resources,” “recreational opportunities,” “expectations,” and “recreational satisfaction” have precise definitions in the context of this analysis and are defined below in the Recreation User Groups subsection.

4.3.5.1 Analysis Methods

4.3.5.1.1 Indicators

The indicators for this resource issue analysis are the following:

- Acres with targeted recreation management.
- Acres of SRMAs and ERMAs that would provide opportunities for beneficial recreational experiences.
- Acres of VRM Class I and II areas within SRMAs and ERMAs that would maintain scenic quality as a part of the recreational experience.
- Changes in the number of recreation opportunities (e.g., the number of targeted recreation activities emphasized in SRMAs).
- Acres of land or linear miles of trail that provide opportunities for beneficial recreational experiences for recreation user groups in the planning area.

4.3.5.1.2 Methods

The method used to assess impacts to recreation resources was to determine whether the management actions under each of the alternatives would increase or decrease the recreational opportunities for the range of user groups typically recreating within the Carlsbad planning area. Recreational opportunities for the action alternatives were quantitatively assessed by comparing the management actions that would increase or decrease the size of SRMAs and ERMAs, increase or decrease the acres of VRM Class I or II within SRMAs and ERMAs (scenic quality being an important component of recreation), and the acres of targeted recreational experiences, opportunities, and benefits. Targeted recreation refers to the management of areas emphasizing a specific type of recreation with the purpose of reducing the likelihood for resource use conflicts. An example of a targeted use would be setting aside an area within an SRMA that emphasizes OHV use, while setting aside another area within that SRMA for hiking only so that these two user groups can have opportunities for a satisfying recreational experience independent of the other

recreation use. Other quantitative measures included assessing the increase or decrease in the types of recreational opportunities (for example, managing for one type of use such as OHV riding versus managing for OHV riding, hiking, and sightseeing) and quantitatively measuring the miles or acres of trails and travel routes within an SRMA and ERMA.

The BLM's Recreation Setting Characteristic (RSC) concepts were also used in the analysis of impacts within SRMAs and ERMAs. The RSCs are a way of describing the current and desired conditions for SRMAs and ERMAs so that BLM recreation management can modify conditions in ways that recreation users within these areas will more likely have opportunities for satisfying experiences. The RSCs are divided into three main categories: physical settings, social settings, and operational settings. The physical settings describe the area's remoteness, naturalness, and the visitor facilities; the social settings describe the level of contacts between users, the group sizes, and the evidence of visitor use; the operational settings describe the access to the area by public users, visitor services and information available to users, and management controls. As mentioned above, both existing conditions and desired conditions are described. The criteria are then used in the analysis of impacts by assessing how the proposed management actions of the No Action and action alternatives would affect the existing and desired conditions within the SRMAs and ERMAs.

The recreation affected environment (see Chapter 3) briefly describes the existing SRMAs and developed recreation areas, as well as the types of recreational activities for which they are currently being managed. As mentioned, the ERMA encompasses all of those areas within the planning area that are not managed as SRMAs. The recreational activities, benefits, and opportunities in ERMAs are not as focused as for SRMAs, and no ERMAs were specifically defined in the current RMP.

4.3.5.1.3 Assumptions

A number of assumptions were used in assessing the impacts of management actions on recreational opportunities. These assumptions were based on the affected environment descriptions mentioned above, detailed CFO descriptions of the planning area SRMAs and ERMAs, and the proposed SRMAs, ERMAs, and other developed areas within the planning area:

- An assumption used in the analysis of the proposed management actions that may impact recreational resource users was, that resource users within the planning area could be classified into specific user groups, each having individualized recreation expectations, objectives, settings, opportunities, and needs to achieve satisfying recreational experiences that yield and personal, social, economic, and environmental benefits;
- Each resource user group has specific recreational conditions and criteria (RSCs) that increase the likelihood for satisfying recreational experiences;
- Resource user group criteria (i.e., wants, needs, satisfying experiences, dissatisfactions) are applicable to all areas where they tend to gather for recreation, and are not dependent upon the locality of a specific BLM Field Office;
- It was assumed that emphasizing specific user groups within SRMAs and ERMAs would enhance and increase the likelihood that recreational users would have satisfying experiences because user conflicts would be reduced; and
- Satisfying recreational experiences are related to high scenic quality, and high-quality scenery is an important recreational expectation, so it was assumed that management actions that protect or preserve scenery (under VRM Class I and II objectives) would enhance the recreational experience; management actions that allow surface disturbance and increased landscape changes (under VRM Class III and IV objectives) would degrade the recreational experience.

Recreation User Groups

Recreation user groups, their preferences, the effects that would adversely impact their recreation experiences, and other user group criteria were obtained from approved BLM RMPs (Moab RMP 2008, Monticello RMP 2008). The Moab BLM Field Office conducted personal and group surveys, interviewed national and international user group organizations, and conducted field studies to gain a sense of what recreation users within a user group want and need for satisfying experiences. The recreation user groups within the CFO planning area and assumed conditions and criteria for satisfactory recreational user experiences are as follows.

Motorized (off-highway vehicle)

This group would include users of off-road motorcycles, ATVs, and four-wheel drive vehicles.

This group prefers a range of settings from remote, natural-appearing environments, through settings that include upgraded, unpaved routes and challenging trails, to settings that could include moderate evidence of human sights, sounds, and surface disturbances. A moderate concentration of users and the presence of human-constructed structures are acceptable. Trails and facilities provided for group activities (including parking lots, trail information, trailheads, and toilet facilities) are generally positive for this group.

Overcrowding and overuse of trails, particularly by non-motorized users such as hikers or mountain bikers, would have a negative impact on their experience. Moderate numbers of hikers, bikers, or equestrians are unlikely to negatively affect their recreational experiences.

Non-motorized OHV

This group would include but is not limited to mountain bikes as a non-motorized vehicle. Mountain bike users prefer a relatively natural environment, with challenging trails ranging from beginner to advanced, where evidence of human disturbances, restrictions, and controls are present, but are subtle or do not dominate the environment. Recreation facilities would be optional and would blend with the natural environment. Recreation management would encourage user dispersal. Preferred facilities include semi-primitive camping with basic facilities (parking lots, trailheads, and toilet facilities).

Overcrowding, noise (particularly from motorized users), dust/exhaust, and poor trail etiquette from other users can have a negative impact on the recreational experience.

River and Lake Users

This group would include those recreating in boats, canoes, kayaks, and rafts.

The needs of this group are similar to those of the non-mechanized user group (see below), with a natural-appearing environment that shows little evidence of human disturbances within the river corridor or on the lake. Other than boat ramps and restroom facilities at put-in and take-out locations, as well as designated primitive campsites, facilities needs are few.

Overcrowding, noise, and impacts to visual resources would detract from the user experience.

Scenic Drivers

This would include users of passenger vehicles and recreational vehicles (RVs) driving for pleasure while enjoying scenic attractions.

This user group prefers paved access to scenic vistas, cultural sites, and interpretive stations with turnoffs and/or temporary parking.

High traffic volumes, crowded kiosk parking areas, impacts to visual resources from paved viewpoints, and crowded developed campsites would negatively affect this user group.

Non-mechanized

This group would include hikers, backpackers, and horse riders (equestrians).

This group prefers a natural-appearing environment with little evidence of disturbance, few restrictions or visitor controls, no motorized users, and few mountain bikers. Trails, signs and active management that foster dispersal of users are the typical management actions needed for this user group.

Negative recreational experiences include those listed under mountain non-motorized, but would also include the high speeds of mountain biking and motorized users. The speed and noise of motorized users is of particular concern to equestrian users (BLM 2008b).

Specialized Recreation

This diverse user group includes cavers and rock climbers.

This group prefers locations that provide the conditions for specialized recreation. Cavers prefer a range of challenging caves in sufficient numbers so that crowding is minimized. They also prefer to have a natural environment, free of development in the surrounding area, with sites for primitive camping. Developed overnight camping sites can create conditions for an unsatisfying experience (cavers prefer overnight camping with few amenities). Rock climbers prefer a range of challenging routes in sufficient numbers so that crowding and waiting is minimized. Overcrowding of a given area may detract from the user or group experience for either cavers or rock climbers.

The term "recreational resources" is used throughout this section. For analysis purposes in this document, recreational resources are defined as the natural elements (e.g., scenery, soils, vegetation, geology, land forms, weather, etc.) within the environment that provide the physical basis for recreation. Recreational "opportunities" are defined as the combination of the natural elements and human-controlled conditions (e.g., roads and trails, developed and undeveloped sites, signs, route markers, facilities, etc.) that create the potential for recreation. Recreational "expectations" are those assumptions made by the recreation resource user that, having prepared for the desired recreational experience, he or she will have that desired experience (e.g., a challenging or scenic OHV trail, on-road driving while enjoying high-quality scenery, or the natural sights and sounds of an undeveloped landscape along a hiking trail). Recreational user "satisfaction" can be defined as the mental state in which the resource user is able to successfully benefit from the available recreational opportunities and resources and recognizes that his or her recreational experiences meet or exceed those recreational expectations.

4.3.5.2 Resources Eliminated from Further Impacts Analysis

The management actions of some resources within the planning area would have no impacts on recreation resources. These are described below.

4.3.5.2.1 Impacts of Cultural Resource Actions on Recreation

Under all of the alternatives, management actions include the development of management plans to protect cultural resource complexes and sites, mitigate damage to cultural resources, and nominate eligible sites for the NRHP. Management actions would also solicit research for identification, monitoring, and data gathering of cultural resources. These actions would have no direct impact on recreation or recreationists because there are no specific actions to inhibit recreation or reduce recreational opportunities within the planning area. Likewise, there are no cultural resource management actions that would indirectly impact the recreational experience for user groups.

4.3.5.2.2 Impacts of Paleontological Resources Actions on Recreation

For all of the alternatives, there are no specific management actions that would decrease or increase the opportunities for recreational fossil collection beyond those already in place. The Paleontological Resource Preservation Act stipulates that vertebrate fossils can only be collected by qualified individuals; however, invertebrate and plant fossils can be casually collected without a permit by the public on public lands for non-commercial use. There would be no impacts of planning area actions on recreation resources and users because recreational fossil collection under current and proposed management actions would be unchanged.

4.3.5.2.3 Impacts of Water Resources Actions on Recreation

There are no management actions common to all of the alternatives or described under the No Action and action alternatives that are specifically applicable to recreation resources or opportunities. Water resources actions would evaluate flood hazards in the planning area and seek to reduce flood risks, watershed management plans would be developed, water rights would continue to be acquired as needed to continue public land management, and injection wells would not be permitted in freshwater aquifers. These actions would have no impacts on recreation because they would neither increase nor decrease opportunities for water-related recreational opportunities.

Specific actions under the No Action and action alternatives would include actions to preserve water quality, manage the disposal of produced water from oil and gas wells, and manage water used for livestock and municipalities. These actions would have no impacts on water-related recreational opportunities for the reasons discussed above.

4.3.5.3 Direct and Indirect Impacts

4.3.5.3.1 Impacts of Recreation Actions

Impacts from Management Common to All

Under all of the alternatives, RAMPs would be developed for all of the SRMAs in the planning area. These RAMPs would consider the specific recreation objectives for each of the SRMAs and include management prescriptions to address the levels of recreational activity and recreation resources so that conditions and opportunities are created for satisfying experiences by recreation user groups. The impacts of developing the RAMPs would be beneficial to recreation in the long term because the needs and recreation objectives for each SRMA would be considered and SRMA-specific actions would be taken to ensure satisfying and beneficial outcomes for all of the users.

Impacts from Management Common to All Action Alternatives

Under all of the action alternatives, the BLM's Benefits-Based Management system would be applied to the proposed SRMAs that include targeted outcomes to enhance personal, community, economic, and environmental goals. This would have beneficial impacts on all user groups, as all SRMAs would be managed with prescriptions to increase the likelihood that resource users' recreation needs are met and that they would have satisfying recreational experiences.

The management actions and the impacts of those actions for all of the action alternatives are as follows:

1. A Cave Resources SRMA would not be designated. There would be no impacts caused by this management action because this area would be designated as the Cave Resources ACEC, with prescriptions to "develop a comprehensive ACEC management plan to direct the management of cave visitor use, scientific research, and other cave related projects."
2. The Hackberry Lake OHV Area and Alkali Lake Area would be the preferred locations for recreational OHV use, including commercial and organized competitive OHV events. This would be beneficial in the long term for all recreational resource users because the area would be managed as a target area for OHV use, which would potentially reduce user conflicts between mechanized and non-mechanized users in the planning area.
3. Four SRMAs would be designated under all of the action alternatives: Black River, Hackberry Lake, Conoco Lake, and La Cueva Trails. The impacts of applying special management to these areas would be beneficial for all resource user groups. These SRMAs include opportunities for a variety of recreation experiences ranging from front country, developed motorized OHV and waterways enjoyment, to middle–backcountry wildlife viewing, equestrian and hiking, and dispersed, primitive camping.
4. Camping would be prohibited within 900 feet of all natural and human-made water sources (excluding the Pecos River). The impacts to recreation resources would be beneficial because the potential for polluting these water sources would be reduced; however, the impacts to non-mechanized campers and hikers would be adverse. Non-mechanized users often rely on these water sources for cooking, cleaning, and drinking as they cannot always carry all the water that they need. Having to hike potentially 1,800 feet (round trip) or more for water would not create conditions for beneficial outcomes and satisfying experiences for this user group.
5. Rock climbers would be prohibited from creating bolted routes, using permanent anchors, or using fixed hardware for any climbing activities without prior coordination. The impacts to recreation resources and to specialized users would be beneficial. The climbing areas and routes would be beneficially maintained by reducing damage to the rock face and by maintaining the appearance of the route. Specialized resource users would benefit from the opportunities for a challenging climb, which would otherwise be diminished by the use of pre-set hardware and other climbing aids.

As is described under the Impacts of Special Designations (ACECs) Actions on Recreation subsection below (and for the same reasons), the format for analyzing the impacts of recreation management actions on recreation is organized differently for the No Action and action alternatives than the other resource impacts. The impacts are arranged by SRMA and ERMA to allow the reader to more easily see and compare the range of alternative impacts on each designated recreation management area.

Table 4-169 can assist the reader in comparing the impacts from recreation management actions on existing and proposed SRMAs and ERMAs. A detailed discussion of impacts follows the table.

Table 4-169. Summary of SRMA and ERMA Designation and Acreages for the No Action and Proposed Action Alternatives

SRMA/ ERMA	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Alkali Lake	944-acre, no SRMA or ERMA designation	318-acre SRMA	318-acre SRMA	1,341-acre ERMA	1,341-acre, Same as No Action Alternative
Black River	1,275-acre SRMA designation	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
Cave Resources	8,626-acre SRMA designation	No SRMA or ERMA designation*	Same as Alternative A	Same as Alternative A	Same as Alternative A
Conoco Lake	7-acre, no SRMA designation	7-acre SRMA	Same as Alternative A	Same as Alternative A	Same as Alternative A
Hackberry Lake	53,560-acre SRMA designation	36,889-acre SRMA designation	Same as Alternative A	Same as Alternative A	Same as Alternative A
La Cueva	1,565-acre, no SRMA designation	1,565-acre SRMA	Same as Alternative A	Same as Alternative A	Same as Alternative A
Pecos River Corridor	6,008-acre SRMA	9,936-acre SRMA	9,936-acre ERMA	Same as Alternative B	9,936, No SRMA or ERMA designation
West Wells Dune	624-acre, no SRMA or ERMA designation	Same as No Action Alternative	624-acre ERMA	Same as Alternative B	Same as Alternative B
Pecos River Equestrian Trail	11,207-acre, no SRMA or ERMA designation	11,022-acre ERMA	10,052-acre ERMA	Same as Alternative C	8,832-acre ERMA
Hay Hollow Equestrian	12,913-acre, no SRMA or ERMA designation	12,913-acre ERMA	Same as A	Same as No Action Alternative	Same as No Action Alternative
Square Lake	5,285-acre, no SRMA or ERMA designation	2,975-acre ERMA	Same as Alternative A	5,285-acre ERMA	Same as Alternative C

*The Cave Resources area would be managed within the proposed Cave Resources ACEC. See ACEC alternatives impacts Subsection 4.3.5.3.15 below.

Alkali Lake

No Action Alternative

Under current management actions the 944-acre Alkali Lake area would be managed with an emphasis on OHV use that includes both organized, unstructured and undeveloped OHV recreation. Management prescriptions would include applying oil and gas stipulations to ensure that OHV trails and camping areas are protected from development, maintaining the entire area as open to livestock grazing, and managing the SRMA under VRM Class IV objectives. The area would be open to cross-country OHV recreation, and managed under VRM Class IV objectives. The impacts to motorized and non-motorized OHV use would be

beneficial in the long term, as the area would be managed to provide a range of OHV recreational opportunities for these user groups, would continue to be used as an area that emphasizes these recreational activities, and would maintain opportunities for beneficially developing motor skills, reducing stress, and sharing time with friends and family. The impacts to the area's RSCs would be adverse. Without ERMA or SRMA designation, infrastructure, access, and visitor information would not likely be developed or prioritized for OHV users. A lack of formal management of the area would not likely control contacts between users, which could exceed levels of recreation satisfaction, and trails would be informally developed and maintained.

Alternatives A and B

Under these alternatives, the Alkali Lake area would be designated as a 318-acre SRMA, with a recreational focus on unstructured and unfocused OHV experiences. A RAMP would be developed for the area to ensure that opportunities for motorized and non-motorized OHV experiences are maintained. The use of OHVs within the SRMA would be OHV limited; however, the area would be effectively open to cross-country OHV travel on all of the SRMA because the limited route designation would include the entire OHV play area. The area would be managed under VRM Class III, and open to livestock grazing. These actions would be beneficial in the long term for mechanized users because they would provide a range of OHV opportunities for route recreation. The impacts to recreation resources would be less adverse than the No Action Alternative because VRM III management objectives would surface disturbances would be more limited than under VRM Class IV objectives. The impacts would be more beneficial to OHV users than the No Action Alternative because the emphasis on OHV recreational uses, benefits, and infrastructure would be specifically managed and maintained through stipulations in the area's RAMP. However, the impacts would be less beneficial than the No Action Alternative because the range of OHV recreational opportunities would not include structured (e.g., competitive) OHV use in the area's management objectives. The impacts to the area's RSC would be beneficial under these alternatives because the proposed RAMP would provide the opportunity to develop user group infrastructure (e.g., paved parking areas, paved access to sites, signs, and information kiosks) that would enhance users' recreational experiences and benefits. Existing routes and trails would be maintained and improved, and user contacts would be maintained at levels that promote OHV satisfactory experiences.

Alternative C

Alternative C management actions would designate Alkali Lake as a 1,341-acre ERMA for unstructured and undeveloped OHV use. Recreational OHV use would be OHV limited (but functionally open to cross-country travel as discussed under Alternative A), and the ERMA would be managed under VRM Class III objectives. A RAMP would not be developed for the ERMA. Facilities such as a parking lot, trash cans, signs, and toilets would be built if conditions warrant these types of infrastructure; these conditions could include increased popularity and use of the ERMA or recreational use demand. The impacts to recreation resources would be less adverse in the long term, when compared to the No Action Alternative, because surface disturbances to scenic quality would be more limited under VRM Class III objectives compared to VRM Class IV management under the No Action. The impacts to the targeted OHV recreation users would be beneficial in the long term because opportunities for OHV recreation would be maintained, though not as formally as under SRMA management; however, there would be adverse impacts because user contacts would not be managed to promote satisfactory experiences. The impacts to the recreational setting would be beneficial because desired infrastructure would be developed (as needed) to enhance the recreational experience and benefits. Compared to the No Action Alternative, this alternative would be more beneficial to OHV recreation users in the long term because OHV opportunities within the designated ERMA OHV target area would be improved with as-needed infrastructure, and scenic quality would be maintained at a moderate level of disturbance through VRM Class III objectives.

Alternative D

Under Alternative D, the 1,342-acre Alkali Lake area would not be managed as an SRMA or as an ERMA, but would be managed according to the planning area's Travel Management Plan. The area would be managed with prescriptions similar to the No Action Alternative: travel designated as OHV limited, but effectively open to OHV cross-country travel (as discussed under Alternative A), open to livestock grazing,

and managed under VRM Class IV objectives. The impacts to recreational OHV users would be beneficial in the long term, but to a lesser degree than the No Action Alternative because the recreation resource would not be directly managed to maintain its current use as an OHV play area. There would be long-term, adverse degradation of the area's RSCs from a lack of management prescriptions to prevent overcrowding and overuse of trails, and a lack of facilities for users and OHV groups that would likely reduce the opportunities for satisfying experiences and beneficial outcomes. This alternative would have the least beneficial impacts on recreation.

Black River SRMA (Including the Cottonwood Day Use Area)

No Action Alternative

Current management would designate the 1,275-acre area as an SRMA with an emphasis on non-mechanized and water-related recreational activities, such as swimming, shoreline fishing, wildlife viewing, and hiking. Under this alternative, the area would be managed under VRM Class III objectives, and the area would be closed to OHV use, equestrian use, and livestock grazing. The impacts on the targeted non-mechanized and water users would be directly beneficial in the long term because the area's RAMP would promote wildlife viewing. Recreational enhancements within the SRMA would create a greater range of opportunities for recreational experiences and beneficial outcomes for all visitors that include enjoying the scenic and natural landscape, reducing stress, escaping from crowds, and interacting with family and friends. Management under VRM Class III objectives for moderate surface disturbances would have indirect, long-term, adverse impacts on the recreation resource and long-term indirect and adverse impacts on all users because scenic quality would be degraded under VRM Class III objectives. The impacts to the area's RSCs would be beneficial because infrastructure would continue to be added as need under the RAMP, and the natural landscape (creating a sense of naturalness) would be maintained by controlling surface disturbances.

Alternatives A through C

Under these action alternatives, the 1,275-acre area would be designated as an SRMA with the same management objectives and emphases as the No Action Alternative. The SRMA would be closed to OHV travel and closed to livestock grazing. Long-term beneficial scenic quality protection would be prescribed by managing the undeveloped portion of the SRMA (outside Cottonwood Day Use Area) under VRM Class II objectives to preserve scenic quality. Compared to the No Action Alternative, these alternatives would have more beneficial impacts on recreation resources and on users because the long-term preservation of scenic quality would enhance visitor experience with an increased likelihood for satisfying experiences and beneficial outcomes on non-mechanized user groups. The impacts to RSCs would be the same as discussed for the No Action Alternative for the same reasons.

Alternative D

This alternative would have similar impacts as discussed for action Alternatives A, B and C, except that the area would be adversely open to NSO mineral leasing (with major constraints to comply with VRM Class II scenic quality objectives). Compared to the No Action Alternative, this alternative would be more beneficial because management under VRM Class II objectives would preserve scenic quality within the SRMA. The impacts to RSCs would be the same as discussed for the No Action Alternative for the same reasons.

Cave Resources SRMA

No Action Alternative

Current management actions under the No Action Alternative would continue to manage the 8,626-acre Cave Resources areas as an SRMA. Actions under this alternative would close the SRMA to all minerals activities, and 5,627 acres (65% of the SRMA) would be managed under VRM Class I and Class II objectives to protect scenic quality, 2,889 acres (33%) would be managed under VRM Class III, and the remaining area would be managed under VRM Class IV (160 acres). Within the SRMA, 7,739 acres (98% of the area) would be managed for OHV limited travel. The SRMA would be open to livestock grazing. The impacts to recreation resources would be beneficial in the long term because OHV surface disturbances would be limited, and most of the SRMA would be protected at high and very high levels of scenery preservation. Livestock grazing would have an adverse impact on primitive camping areas. The impacts to

the SRMA's emphasized specialized recreation users (cavers) would be beneficial because their needs for a natural, undisturbed landscape would be maintained, which would increase the likelihood for satisfying recreational experiences. These experiences would include spending time with friends and family, enjoying risk-taking adventure, and improving skills and abilities with beneficial outcomes of reduced stress, improved mental health, and a closer relationship with the natural world. The impacts to the area's RSCs would be beneficial because surface disturbances around cave sites (maintaining a sense of naturalness) would be minimized. User group contacts, managed under the RAMP, would be maintained at levels that ensure opportunities for satisfactory experiences.

Alternatives A through D

Under all of the action alternatives, the Cave Resources SRMA would not be designated. The 8,626-acre acre and additional cave resource areas would be designated for management within the 18,832-acre Cave Resources ACEC. See Subsection 4.3.5.3.15 below for a description of impacts to the area from management under the ACEC action alternatives. Under the management actions of the proposed Cave Resources ACEC, the RSCs would be beneficially impacted. The emphasis on managing the ACEC recreation resources for specialized caving users would have the same impacts as discussed above for the No Action Alternative: naturalness would be maintained, user group contacts would be managed for satisfactory experiences, and infrastructure would be developed, as needed, to meet the targeted user group's needs.

Conoco Lake SRMA

No Action Alternative

The 7-acre Conoco Lake area is not currently managed as an SRMA, but the area is managed with an emphasis on picnicking, fishing, hiking, and wildlife viewing. The area's targeted recreational activity is fishing. The area would be managed under VRM Class IV objectives, and the area would be OHV limited. The area would be open to livestock grazing. The impacts to the area's recreation resources from these management actions would be adverse in the long term: VRM Class IV objectives would permit major surface disturbances and modifications to the recreation area's landscape, which would cause long-term scenic quality degradation. The impacts to recreation users would be adverse in the long term as a result. Permitted limited route OHV use would be beneficial for mechanized OHV users, but would create long-term adverse user conflicts with non-motorized users of the area (picnickers, hikers, non-motorized boaters, wildlife viewers), who are the recreation users for which the area would be primarily managed. Resource user conflicts would diminish the opportunities for non-motorized users to have satisfactory recreational experiences and would diminish the likelihood for expected beneficial outcomes such as reduced stress and improved well-being. While OHV users would gain these beneficial outcomes, other recreation user groups would not likely gain expected beneficial outcomes because of OHV-produced dust and noise, and the loss of a sense of naturalness. The loss of a sense of naturalness for the targeted activity, OHV noise, loss of solitude, and user conflicts would have adverse impacts on the area's RSCs.

Alternatives A through C

Under all of the action alternatives, the Conoco Lake area would be designated as a 7-acre SRMA. Under these action alternatives, the management actions would be the same: scenic quality management under VRM Class II objectives to preserve scenic quality, closed to livestock grazing, and closed to OHV travel. The impacts to recreation resources would be beneficial in the long term because surface disturbances would be reduced and through the reduction of surface disturbances under VRM Class II objectives. The impacts to the targeted non-mechanized recreation user groups would be beneficial because user group conflicts would be reduced in the short term by restrictions on additional surface disturbances. OHV users would also experience an adverse loss of opportunities because this activity would be prohibited within the SRMA. Compared to the No Action Alternative, these alternatives would have similar impacts in the long term because the conditions for resource use conflicts, overcrowding, and degradation of the landscape would be present. The impacts on the area's RSCs would be beneficial because the SRMA would preserve the desired sense of remoteness and solitude. The desired preservation of naturalness and development of infrastructure within the SRMA would also be beneficial for the targeted users.

Alternative D

The impacts to recreation resources would be the same as discussed above for Alternatives A through C because management prescriptions would be the same, except that non-motorized boating would be allowed, which would have long-term beneficial impacts on the users of the area by increasing the range of water-related opportunities. The impacts to RSCs would be the same as discussed for the other action alternatives (A–C) because the management actions would be the same.

Hackberry Lake SRMA

No Action Alternative

The management actions under the No Action Alternative would continue to manage the 53,560-acre Hackberry Lake area as an SRMA, but subdividing the area into two RMZs, or recreational activity target areas. An RMZ is an area within an SRMA that is managed for specific types of recreational uses. The Hackberry Lake SRMA would be composed of two RMZs: the Dunes RMZ and the Trails RMZ. The Dunes RMZ would be managed with a recreational emphasis on camping, OHV use, sand sledding, photography, hiking, and picnicking. The Trails RMZ would be managed with an emphasis on camping, OHV trail riding, picnicking, and OHV racing.

Under this alternative, travel throughout both of the RMZs within the SRMA would be OHV limited. The SRMA would be managed under VRM Class IV objectives, and open to livestock grazing. The impacts to recreation resources would be adverse in the long term because of permitted major modifications to the landscape (and increased scenic quality degradation) under the VRM Class IV objectives and from livestock grazing. The impacts to recreation user groups would vary: motorized and non-motorized OHV users (motorcyclists, four-wheelers, and mountain bikers) would benefit in the long term from OHV recreational opportunities along existing routes within the SRMA; non-mechanized users would be adversely impacted by dust, noise, reduced opportunities for naturalness and isolation. However, both of the RMZs would be managed primarily for OHV non-competitive and competitive recreational opportunities that would include picnicking, photography, hiking, and camping. Under this alternative, there would be long-term adverse resource user conflicts between mechanized OHV users and non-mechanized users: noise, dust, and OHV intrusions would adversely diminish non-mechanized users' expected experiences and reduce the likelihood for satisfying recreational experiences. OHV users would be adversely affected by slower and/or hidden picnickers, hikers, campers, and photographers; and safety concerns and adverse user conflicts would exist between sand sledders and OHV users in the Dunes RMZ. However, the range of OHV recreational opportunities and related activities would likely create satisfying experiences that would benefit mechanized user groups in the long term and produce outcomes that include improved well-being, enhanced OHV motor skills, and greater self-reliance. In the long term, non-mechanized users would experience diminishing opportunities for satisfying experiences. The impacts on RSCs for the SRMA would be beneficial as recreation-related infrastructure would continue to be developed for the targeted user groups, and improvements to trails, access roads, and parking areas for the targeted OHV users would be beneficial also.

Alternatives A through D

These action alternatives would apply similar management actions to the designated 36,889-acre SRMA: the entire area would be available for OHV limited recreational opportunities. The SRMA would be managed under VRM Class III objectives, and open to livestock grazing. The adverse impacts to recreation resources within the SRMA would be the same as discussed for the No Action Alternative, but to a lesser adverse degree, because surface disturbances would be reduced under VRM Class III objectives. The impacts to non-mechanized user groups would be the same as discussed for the No Action Alternative because the SRMA would be managed primarily for OHV users and managed to ensure that OHV users have opportunities for a range of satisfactory experiences and beneficial outcomes. However, resource user conflicts and safety concerns would be reduced in both of the RMZs because OHV use would be limited to routes. Compared to the No Action Alternative, these alternatives would have a reduced adverse impact on recreation resources in the long term because of the limitations on surface disturbances imposed by VRM Class III objectives. The impacts on resource users would be the same as discussed under the No

Action Alternative because the actions are similar to that alternative. The impacts to RSCs would be the same as the No Action Alternative because management actions would continue to develop infrastructure and area improvements that benefit the targeted OHV users.

La Cueva SRMA

No Action Alternative

Under current RMP management, the 1,565-acre La Cueva area would not be managed as an SRMA. The area would be open to livestock grazing and would be OHV limited throughout the area. The area would be managed under VRM Class IV objectives on 1,024 acres (65% of the area) with 482 acres managed under VRM Class III objectives (31% of the area) for permitted moderate to major changes to the landscape, and the remainder (60 acres) managed under VRM Class II objectives. In the long term, under current management actions, impacts to recreation resources and recreation users in the area would be adverse. As discussed in Recreation Affected Environment Chapter, the area is a popular and informal mountain biking and equestrian riding locale with approximately 33 miles of hiking trails but is currently and continues to be degraded by its use as a public dumping ground. The impacts to recreation resources would be adverse in the long term because management under current VRM objectives and permitted livestock grazing, and uncontrolled public dumping would continue to create surface disturbances and degrade scenic quality. The impacts to all recreation user groups (mechanized and non-mechanized) would be adverse in the long term because the area would not be managed to maintain opportunities for satisfying non-motorized recreational experiences and not formally managed to reduce, eliminate, or discourage public dumping. The impacts to RSCs would be adverse because the physical characteristics would continue to be degraded, the trails would be formally managed to improve the area's social characteristics, and infrastructure would not be improved.

Alternatives A through D

Under these action alternatives, the 1,565-acre La Cueva area would be managed as an SRMA, with an emphasis on non-motorized recreation that includes mountain biking, hiking, equestrian travel, and dispersed camping. Management actions would designate the entire SRMA as VRM Class III, permitting livestock grazing within the entire SRMA, and as OHV limited. The impacts to the SRMA's recreation resources would be adverse in the long term because, as discussed above for the Black River SRMA, cattle cause surface disturbances that degrade the scenic landscape, and VRM Class III objectives permit moderate surface disturbances to the landscape. As discussed throughout this section, a natural or naturally appearing landscape is an important component of the expected recreational experience, particularly for non-motorized and non-mechanized users. The permitted surface disturbances to the scenic landscape would have long-term, adverse impacts on the non-motorized user groups for which this SRMA would be primarily managed. The SRMA objectives of creating recreational opportunities for experiences that allow users to escape enjoy scenery and natural landscapes and interact with the environment would not likely be met. The SRMA beneficial goals of reducing stress and gaining closer relationships with the natural world would not likely be met. However, the beneficial goals of escaping from crowds, fostering family interaction, testing and improving rider skills, and gaining an understanding of recreation in the community would likely be met. There would be no impacts to motorized OHV users because the area is not used for this type of recreation and would not be managed for those users under these alternatives. Under the action alternatives, the impacts to RSCs would be beneficial because the current level of physical remoteness and naturalness would be maintained and improved under SRMA stipulations. The SRMA trails would be more beneficially maintained, and infrastructure improvements (repaving access roads, widening roads and trails, building information kiosks, toilets, picnicking areas, etc.).

Compared to the No Action Alternative, these alternatives would be more beneficial because managing this area as an SRMA would eliminate public dumping and improve recreational infrastructure for users of the area. Maintaining hiking, equestrian, and mountain biking trails would increase the likelihood for satisfying recreational experiences in the short-term, and beneficial outcomes for these user groups that include reduced stress, improved mental health, improved riding skills, and a finer appreciation of the natural world.

Pecos River Corridor SRMA

No Action Alternative

Under the No Action Alternative, the 6,008-acre Pecos River Corridor would continue to be managed as an SRMA, with an emphasis within the Pecos River RMZ on recreational boating, hunting, fishing, and wildlife viewing. Defined as a 0.5-mile-wide corridor on public lands along the Pecos River, management actions would maintain the SRMA as open to livestock grazing (91% of the SRMA would be open) and manage the SRMA as VRM Class II. The SRMA would manage 5,497 acres (91% of the SRMA) as limited OHV, with the remaining area closed to OHV use. The SRMA would prohibit mineral surface occupancy on 5,619 acres (94% of the SRMA). The impacts of the current SRMA management actions on recreation resources would be beneficial in the long term because minerals stipulations and VRM Class II objectives would limit adverse surface disturbances within the SRMA and maintain the SRMA's scenic quality, and limiting OHV use would limit surface disturbances to previously impacted areas. Livestock grazing within the SRMA would have long-term, adverse impacts on recreation resources (as discussed in the Livestock Grazing actions on Recreation subsection, see below) by consuming wildlife forage, creating conditions for soil erosion, and creating conditions for the spread of non-native, invasive weed species.

The impacts on recreation users would be beneficial in the long term for mechanized and non-mechanized user groups because OHV route limitations would reduce resource use conflicts by segregating these user groups by maintaining an RMZ focus area. Scenic quality preservation under VRM Class II objectives would create conditions and opportunities for all users to experience expected outcomes that include high scenic quality. Beneficial outcomes for all users in the SRMA from managed conditions that maintain scenic quality and limit surface disturbances would include diminished stress, improved mental health, and a closer relationship with the natural environment. Wildlife viewing users would be adversely affected in the long term by livestock grazing within the SRMA for the reasons discussed in the livestock grazing subsection: loss of wildlife forage to cattle would reduce opportunities for wildlife viewing; establishment and spread of noxious invasive weeds from conditions produced by cattle would reduce wildlife forage. However, current SRMA management stipulations that include weed control and treatments would continue to offset these adverse conditions. The impacts to the SRMA's RSCs would be beneficial for the same reasons as discussed above: the natural landscape would be maintained and disturbed areas reclaimed where feasible; infrastructure would be maintained and additional infrastructure would be developed as needed.

Alternative A

Under Alternative A, management actions would be similar for the SRMA and RMZ to those discussed under the No Action Alternative, except that the entire (and expanded) 9,936-acre SRMA would be managed with more restrictions on leasable minerals than the No Action with 818 acres closed to leasable minerals development (the rest limited to [NSO] no surface occupancy). The targeted activity within the SRMA would be non-motorized boating. Off-highway travel would be limited, and livestock grazing would be prohibited (closed) to 92% of the SRMA. The impacts on recreation resources and recreation users would be similar to those discussed for the No Action Alternative, but scenic quality would be maintained and enhanced to a greater degree because of greater restrictions on surface disturbances under VRM Class II objectives, and the reduction of livestock grazing impacts. Compared to the No Action Alternative, Alternative A would be more beneficial for recreation resources and all user groups because scenic quality, a major component of expected recreational experiences, would be enhanced in the long term. Recreation user groups that seek wildlife viewing opportunities would benefit in the long term from improved habitat from livestock grazing closure. The impacts to RSCs would be the same as discussed for the No Action Alternative for the same reasons.

Alternatives B and C

Under these alternatives, the 9,936-acre river corridor would be managed as an ERMA, but management prescriptions would be similar to those discussed under Alternative A. The area would be managed under VRM Class II objectives to preserve scenic quality; minerals leasing would be open, but with major (NSO) constraints; and travel use would be OHV limited. However, livestock grazing would be permitted within the ERMA (52% open under Alternative B, and 87% open under Alternative C). The impacts to recreation resources would be beneficial in the long term because the management prescriptions are similar to

Alternative A: surface disturbances would be reduced and scenic quality protected by limiting minerals activities, by limiting OHV use, and by maintaining visual quality at VRM Class II objective levels. Livestock grazing would cause surface disturbances that affect recreational scenic quality and all user groups, but VRM Class II objectives would ensure that this type of disturbance is maintained at a minor level of impact. The impacts to RSCs would be adverse because a RAMP would not be developed to provide for infrastructure needs as rigorously as under a SRMA.

Compared to the No Action Alternative, these alternatives would be less beneficial to resource users because designation of the river corridor as an ERMA under these alternatives would reduce the levels of recreation resource management, a RAMP would not be developed, and recreation-related infrastructure would not be provided except as needs demand. The ERMA would not be specifically managed for boating, hunting, fishing, and wildlife viewing, as designation of the river corridor as an SRMA under the No Action Alternative would ensure that the area was managed specifically for emphasized user groups. There would be the likelihood for adverse resource use conflicts between mechanized and non-mechanized user groups within the narrow corridor from reduced recreational management, which would adversely reduce the likelihood for satisfying recreational experiences. The impacts to recreation resources would be more beneficial under these alternatives than under the No Action Alternative because scenic quality protection would be maintained under VRM Class II objectives.

Alternative D

Under Alternative D, management actions would not designate the 9,936-acre Pecos River corridor as either an SRMA or ERMA, but would manage the area for dispersed use, allowing for recreational use in accordance with other resource management objectives. The area would be managed under VRM Class II objectives, OHV use would be limited, and 8,838 acres of the area (89%) would be open to livestock grazing. The impacts to recreation resources would be the same as discussed for Alternatives B and C because the management actions are similar: surface disturbances would be limited and visual quality would be maintained under VRM Class II objectives and restricting OHV use to limited routes, but a lack of recreational management would create conditions for resource use conflicts within the narrow corridor and reduce the likelihood for recreational infrastructure to meet user needs. Compared to the No Action Alternative, this alternative would have long term impacts as discussed for Alternatives B and C for the same reasons. The impacts to RSCs would be similar to those discussed for Alternatives B and C because the management actions are similar.

West Wells Dune ERMA

No Action Alternative

Under the No Action Alternative, the 624-acre West Wells Dunes area would not be managed as an ERMA, but continued to be managed for unstructured and undeveloped OHV play. The 624-acre area is currently managed under VRM Class IV objectives, travel is OHV limited, and livestock grazing is permitted throughout the area. The entire area would be open to leasable and saleable minerals development. The impacts to recreation resources from limiting OHV would reduce surface disturbances in the area, but this would be offset by surface disturbances from grazing and permitted major landscape changes under VRM Class IV objectives. The impacts to OHV users would be variable: impacts would be beneficial in the long term for OHV users because the area would be managed for this user group, so resource use conflicts would be low; however, there would be long term adverse impacts to OHV users from overcrowding as the area became more popular and use intensified, and the informal management of the area for OHV use would adversely maintain the area at a low priority level for recreation-related infrastructure needed by this user group. There would be adverse impacts to recreation setting social characteristics from informally managed OHV users that could crowd each other; however, there would be no physical characteristics impacts because the dunes are constantly shifting and covering up tracks and other surface disturbances.

Alternative A

Under this action alternative, the 624-acre West Wells Dunes area would not be managed as an ERMA. The area would be managed under VRM Class III objectives, recreational travel would be OHV limited, and the area would be open to livestock grazing. The entire area would be open to leasable and saleable

minerals development. There would be no impacts caused by grazing in this area because the landscape is sparsely vegetated, the dunes are shifting and windblown sand covers grazing areas, and the physical and visual intrusion of humans and vehicles would discourage the presence of livestock. As discussed for Hackberry Lake and Alkali Lake SRMAs, while OHV use would be limited, the dune play areas would be totally included within the limited designation, so there would be effectively open OHV use within the play areas. The impacts to recreation resources from unlimited OHV use on dune slopes would be adverse in the long term because OHV use would contribute to dune erosion. Managing the area as VRM Class III would be beneficial in the long term because VRM Class III objectives would ensure that scenic quality would be managed for moderate surface disturbances to the landscape. The impacts to recreation users from effectively open OHV use would be varied. Unlimited OHV use would be adverse in the long term to all users of the dunes area because of the likelihood of resource user conflicts and increased safety concerns between mechanized OHV users and non-mechanized users (picnickers, photographers, sightseers, and hikers). This would decrease opportunities for satisfying experiences for all users of the area and decrease the likelihood for beneficial outcomes that include enhanced self-reliance, improved mental well-being, and improved OHV motor skills. However, the impacts to OHV users from unrestricted trail and dune use would also beneficially increase the range of OHV recreational opportunities for this user group. The impacts to RSCs would be the same as discussed for the No Action because the level of management and dune dynamics would be the same.

Compared to the No Action Alternative, the impacts of Alternative A would be more beneficial to recreation resources in the long term because management actions would provide greater resource protection under VRM Class III objectives. The impacts to non-mechanized users would be less beneficial in the long term because of increased user conflicts with OHV users. The impacts to OHV users would be more beneficial in the long term because there would be an increase in the range of OHV recreational opportunities when compared to the No Action Alternative.

Alternatives B through D

Under action Alternatives B, C, and D, the 624-acre West Wells Dunes recreation area would be managed as an ERMA, with management actions to protect the area for recreation. The management actions would be the same as discussed for Alternative A, with additional ERMA prescriptions to provide recreation-related infrastructure as needed. The beneficial and adverse impacts to recreation users of the area would be the same as those discussed under Alternative A, with additional beneficial impacts from infrastructure provided as determined by need under ERMA management. The impacts to recreation resources in the dunes ERMA under these action alternatives would be the same as those discussed under Alternative A because the ERMA management prescriptions would be similar: management as VRM Class III and designated OHV limited travel within the ERMA, but effectively open for OHV use. RSC impacts under these alternatives would be the same as discussed for the No Action Alternative for the same reasons as discussed under that alternative.

Pecos River Equestrian Trail ERMA

No Action Alternative

Under this alternative, current management actions would not manage the 11,207-acre Pecos River area as an ERMA. The area would continue to be managed for dispersed use, for undeveloped and unstructured boating and hunting, and as an unstructured and undeveloped system of trails within the Pecos River corridor. Scenic quality would be managed under VRM Class II on 1,940 acres (17%) and VRM Class IV objectives on 9,268 acres (83% of the area). The area would be 92% designated as OHV limited (10,124 acres) and closed on the remaining 897 acres. Livestock grazing would be permitted throughout the area.

The impacts of these management actions on recreation resources would be adverse in the long term because VRM Class IV objectives that permit major modifications to the landscape would degrade scenic quality. Livestock grazing would adversely contribute to scenic degradation by trampling vegetation, compacting soils and creating conditions for soil erosion and vegetation loss. The impacts on mechanized OHV user groups and on non-mechanized users would be adverse in the long term because unstructured use of the area would create resource use conflicts between these groups that would reduce the likelihood for satisfying recreational experiences. Opportunities for non-mechanized solitude, quiet, and a sense of

naturalness would be diminished by OHV noise, dust, and visual intrusions. However, OHV users would benefit from opportunities for trail riding. As discussed in Chapter 3, Section 3.3.5, long-term trends in recreation include an increasing demand for equestrian recreation areas, the increasing interest in water-related areas, and the popularity of the Pecos River corridor. In the long term, the trend of increasing resource use demands and intensifying resource use conflicts in the area would substantially reduce recreational opportunities from management actions under this alternative. The impacts to RSCs would be adverse because user access and other infrastructure would not be developed, trails would not be developed, and group contacts would not be managed for beneficial outcomes.

Alternative A

Management actions under Alternative A would designate the 11,022-acre Pecos River area as an ERMA with the primary recreational target that emphasizes equestrian use and a secondary target that emphasizes non-motorized recreational uses. Actions would allow limited OHV recreation throughout the ERMA, manage visual resources under VRM Class II on 3,954 acres (35%) and under VRM Class IV objectives (7,253 acres or 65%). The area would be open to livestock grazing on 9,512 acres (86%). Management actions under this alternative would beneficially increase scenic quality protection in the area under VRM Class II and limited OHV use, and recreational management of the area would have long term beneficial impacts on resources and users. Compared to the No Action Alternative, this alternative would, in the long term, have more beneficial impacts on recreation user groups and on recreation resources because 1) there would be a reduction in surface disturbances and an increase in scenic quality protection that exceeds the No Action Alternative and 2) the area would be managed as an ERMA. The impacts on RSCs would be both beneficial and adverse under this alternative. Beneficial impacts would be produced by managing a portion of the area to preserve naturalness under VRM Class II objectives. Adverse impacts would result from a lack of infrastructure development and access for both mechanized and non-mechanized users, and no formal management of contact between user groups.

Alternatives B and C

Under Alternatives B and C, the 10,052-acre Pecos River Equestrian Trail would be managed as an ERMA. Livestock grazing would be permitted; however, all of the ERMA would be managed to preserve scenic quality under VRM Class II objectives, a RAMP would be prepared to address infrastructure needs and trail locations. The long-term impacts on recreation resources would be beneficial because scenic quality would be preserved at a high level and surface disturbances minimized under the area's VRM Class II objectives. Non-motorized OHV and non-mechanized user users would benefit in the long term from these management prescriptions because a management plan would be developed to ensure that the needs of these ERMA-target groups were met, which would result in beneficially reduced user conflicts, increased opportunities for satisfying experiences, and beneficial outcomes. The beneficial outcomes would include enjoying scenery and natural landscapes, interacting with the natural environment, diminished stress, improved mental health, and improving equestrian skills. Compared to the No Action Alternative, these alternatives would be more beneficial for recreation resources and for user groups because resource use conflicts would be reduced through active management of the ERMA, and recreation resources would be protected under VRM Class II. The impacts to RSCs would be beneficial because the area's naturalness would be maintained and enhanced under VRM Class II objectives, user group contacts would be managed for beneficial outcomes, and visitor facility infrastructure and access would be provided, as needed.

Alternative D

Alternative D management actions would manage the 8,832-acre Pecos River Equestrian Trail as an ERMA for dispersed recreational use. Under this alternative, OHV recreation throughout the ERMA would be OHV limited, livestock grazing would be permitted. The ERMA would be managed to preserve scenic quality under VRM Class II objectives on 981 acres (11% of the area), 7807 acres (88%) under VRM Class III, and Class IV objectives on the remaining 230 acres. Management actions under this alternative would designate or construct new trails, with no motorized or mechanized use on single track trails. The impacts to recreation resources would be the same as discussed for Alternatives B and C because the management actions are similar. The impacts to recreation users would be the same as discussed for those alternatives. Compared to the No Action Alternative, this alternative would have the same beneficial impacts as discussed for Alternatives B and C, for the same reasons: recreational management of the ERMA would ensure that

resource use conflicts were addressed, and that recreation resources were maintained at a high level of preservation. The impacts to RSCs would be the same as discussed for Alternatives B and C because the management actions are the same.

Hay Hollow Equestrian ERMA

No Action Alternative

Under the No Action Alternative, the 12,913-acre Hay Hollow Equestrian area would not be managed as an ERMA, but would be managed for dispersed recreational use and there would be no trail development. The Hay Hollow area would be managed under VRM Class III objectives on 7,310 acres (57%) for moderate landscape modification and VRM Class IV objectives on 5,603 acres (43%) that allow major modifications of the landscape. The area would be designated as OHV limited, and livestock grazing would be permitted throughout the area. The impacts to recreation resources and recreation users would be the same as discussed above for the Pecos River Equestrian area under the No Action Alternative for the same reasons. The long-term trend of increasing use of the area would create intensifying recreation user conflicts between mechanized and non-mechanized users; scenic quality would become increasingly degraded from OHV use and VRM objectives that allow moderate to major surface disturbances. The impacts to RSCs under this alternative would be adverse because, as discussed above for the Pecos River Equestrian Trail area, user access, parking access and other necessary infrastructure would not be developed, trails would not be developed or maintained, and recreation user group contacts would not be managed for beneficial outcomes.

Alternative A

Management actions under Alternative A would designate Hay Hollow as a 12,913-acre ERMA, and manage the area for dispersed recreational use and no trail development (the same as the No Action Alternative). Management actions would designate OHV limited travel within the 12,913-acre area and the ERMA would be closed to livestock grazing. Scenic quality would be managed under VRM Class III objectives on 9,696 acres (75%) that would allow moderate surface impacts and Class IV objectives on 3,217 acres (25%) that would allow major surface disturbances. The impacts to recreation resources would be adverse in the long term because the VRM objectives would permit moderate to major disturbances to scenic quality throughout the area. The impacts to all recreation users would be adverse in the long term from resource use conflicts between mechanized and non-mechanized users, particularly OHV and equestrian users on trails. The area includes wildlife corridors, so long term increased use of the area by mechanized and non-mechanized users of the area would likely reduce opportunities for recreational wildlife viewing. Compared to the No Action Alternative, this alternative would have the same adverse impacts on recreation resources and users for the same reasons: intensifying use by mechanized and non-mechanized users would create use conflicts; and resources would continue to be degraded over time from permitted surface disturbances. The impacts to RSCs would be the same as discussed for the No Action Alternative for the same reasons.

Alternative B

Under Alternative B, the 12,913-acre Hay Hollow Equestrian area would be managed as an ERMA with a primary targeted emphasis on equestrian trail use and a secondary target on non-motorized recreational use. The ERMA would be closed to grazing, OHV (non-motorized) recreation would be OHV limited, and the area would be managed under VRM Class II objectives on 5,276 acres (41%) and VRM Class III objectives on 7,628 acres (59%). The impacts to recreation resources would be beneficial in the long term because scenic quality would be protected for a substantial portion of the ERMA under VRM Class II objectives, and the elimination of livestock grazing would reduce soil compaction and erosion. The impacts to recreation users would be varied: motorized OHV users would be adversely impacted because opportunities for recreation within the ERMA would be reduced; non-motorized OHV users and non-mechanized users would be beneficially impacted because the focus of the ERMA would be on maintaining the area for these activities. Management prescriptions under the ERMA would beneficially provide recreation infrastructure as needed. So, recreational opportunities would be enhanced for the targeted user groups to likely have satisfying recreational experiences that include biking, horseback riding, wildlife viewing, solitude, a sense of naturalness, and quiet. The impacts to RSCs would be beneficial because, as discussed above, user infrastructure, access, information kiosks, toilets, and parking areas would be developed as needed, User contacts would be controlled by managing trails for mechanized and non-mechanized users, and the sense of naturalness, quiet, and isolation for the targeted users would be

promoted. When compared to the No Action Alternative, this alternative would be more beneficial for recreation resources and non-motorized users from greater protection of scenic quality, increased management as an ERMA, and targeted use for non-OHV users. It would be more adverse for OHV users because the management focus would be for other recreation users.

Alternatives C and D

Under these alternatives, the impacts to recreation resources and user groups would be the same as discussed under Alternative A because the management actions would be similar. The 12,913-acre Hay Hollow area would not be designated as an ERMA, OHV limited throughout the area, and scenic quality management would be either totally (Alternative C) or substantially managed (75% for Alternative D) under VRM Class III objectives that allow moderate surface disturbances to the landscape. Under these alternatives, livestock grazing would be allowed throughout the area. All user groups would be adversely impacted by intensifying resource use conflicts on the existing trails from unstructured management of the area. When compared to the No Action Alternative, the impacts would be the same as discussed for Alternative A for the same reasons: surface disturbances to scenic quality and resource user conflicts. The impacts to RSCs would be the same as discussed for the No Action Alternative, for the same reasons.

Square Lake ERMA

No Action Alternative

Under the No Action Alternative, the 5,285-acre Square Lake recreation area would not be managed as an ERMA. The area would be designated as OHV limited on 2,982 acres (56% of the area) and closed to OHV use on the remaining 2,304 acres (44%), managed under VRM Class IV objectives that permit major surface modifications of the landscape, and open to livestock grazing.

The impacts to recreation resources would be adverse in the long term because livestock grazing, and permitted VRM Class IV management for surface disturbances would continue to degrade scenic quality and create conditions that would reduce the likelihood for satisfying recreational experiences for non-motorized OHV and non-mechanized user groups. The unstructured use of the area for recreation would limit opportunities for satisfying recreational experiences in the long term because increasing OHV use would create user conflicts for all users, and infrastructure would not be provided as needed to meet the increasing demands by OHV and non-OHV users. However, motorized OHV users would continue to benefit from a range of recreational opportunities. The impacts to the RSCs would be adverse because infrastructure development would be limited, and group contacts would likely create use conflicts.

Alternatives A and B

Under these alternatives, the 2,975-acre Square Lake recreation area would be managed as an ERMA with an emphasis on maintaining it as a target area for open OHV play. The area would be managed as OHV limited, but OHV play areas would be effectively open (as discussed above for Hackberry Lake and Alkali Lake SRMAs). The ERMA would be managed under VRM Class III objectives for moderate surface disturbances.

The impacts to recreation resources would be beneficial in the long term because surface disturbances would be reduced under the ERMA management prescriptions. The impacts to recreation users would be beneficial because the ERMA would be managed specifically for OHV use, creating a range of opportunities for satisfying OHV experiences. There would be a beneficial reduction in resource use conflicts because the ERMA would emphasize OHV use. The OHV opportunities would create beneficial conditions for improving riding and motor skills, spending time with family and friends, reducing stress, and escaping crowds. Compared to the No Action Alternative, the action alternatives would be more beneficial for recreation users because maintaining the ERMA as a target area for OHV use would reduce user conflicts. The impacts to recreation resources would be the same as the No Action because the area would continue to experience moderate surface disturbances. The impacts to RSCs for all of the action alternatives would be beneficial because the ERMA designation would raise the priority of the area for as-needed infrastructure development.

Alternative C

Alternative C would have the same management actions as Alternative A, except the ERMA would be increased in size to 5,285 acres, so the impacts would be same as discussed for that alternative.

Alternative D

Under Alternative D, the ERMA would be the same as Alternative A, but increased in size to 5,285 acres and the area would be managed under VRM Class IV objectives for major surface disturbances. The impacts to resources and users would be the same as discussed under Alternative A because the area would be managed specifically for OHV use, travel would be limited, and resource user conflicts would be reduced.

4.3.5.3.2 Impacts of Air Quality Actions on Recreation

Impacts from Management Common to All

As mentioned in the recreation resources introductory subsection above, an assumption for the assessment of impacts to recreation is scenic quality as a component for most recreational activities. Management actions that degrade air quality would have potential short- or long-term adverse impacts on long-distance views of scenery caused by obscuring smoke, haze, dust, and industrial pollutants. All of the alternatives would require projects within the planning area to meet air quality standards, which would directly and indirectly and beneficially impact recreation resources by maintaining long distance views of scenic landscapes within the SRMAs and ERMAs.

Impacts from Management Common to All Action Alternatives

Under all of the action alternatives, management actions would require that drill rig, completion rig, work-over rig, and fracturing pump engines would be required to meet EPA Tier 4 Nonroad Diesel Emission Standards within 1 year of the ROD. Also, vent socks would be required on bulk cement transfers to silos and back into bulk trucks. These actions would have direct and indirect, beneficial impacts on recreation resources in the long term because they would further mitigate the release of potential pollutants into the air and reduce fugitive dust production.

Impacts from the No Action Alternative

Management actions under the current RMP would require that proposed projects meet air quality standards. This would continue to be directly beneficial for all resource users in the long term because required levels of air quality would maintain long distance scenic quality views.

Impacts from Alternative A

Under Alternative A, management actions would require that potential light pollution be mitigated by shading or directing project night lights downward to reduce skyglow. Watering and other approved dust abatement applications would be required to reduce fugitive dust production, and industrial vapor recovery units would be required at drilling sites.

The actions would have direct and indirect, long-term and short-term beneficial impacts on recreation resources by maintaining and improving long distance viewing conditions within the planning area during the day and at night. Compared to the No Action Alternative, Alternative A would provide more beneficial impacts on recreation resources because more stipulations would be required by projects to prevent the production and release of scenery-obscuring atmospheric pollutants.

Impacts from Alternative B

Alternative B would have the same management actions as Alternative A, except light pollution mitigation would only apply within the Guadalupe Escarpment Scenic Area. The impacts to recreation resources from mitigation of industrial emissions on daytime atmospheric clarity would be the same as discussed for Alternative A. Compared to the No Action Alternative, there would be long-term, direct beneficial impacts to recreational night-time sky viewing from reduced skyglow.

Impacts from Alternative C

Management actions under this alternative would not require fugitive dust mitigation, industrial vapor recovery would be determined case-by-case, and light pollution would be mitigated in VRM Class II and III areas only where sensitive receptors (e.g., communities, neighborhoods, scenic vistas) were identified. The impacts to recreation resources would be direct and beneficial because air quality standards would be

required within the planning area. Compared to the No Action Alternative, this alternative would have more long-term, direct, beneficial impacts because more mitigation would be applied to protect long distance scenic viewing.

Impacts from Alternative D

Under Alternative D, there would be no required mitigation of light pollution caused by projects, no fugitive dust mitigation, and the same industrial vapor recovery actions as discussed under Alternative C. The impacts, compared to the No Action Alternative, would be more beneficial for the same reasons as discussed for Alternative C.

4.3.5.3.3 Impacts of Backcountry Byways Actions on Recreation

Impacts from Management Common to All

Under all of the alternatives, the 55-mile Guadalupe Backcountry Byway would continue to be managed for sightseeing, which would be directly beneficial in the long-term to those seeking on-highway, motorized sightseeing opportunities.

Impacts from the No Action Alternative

Under current management actions the byway corridor would be managed under VRM Class II objectives to preserve scenic quality. Scenic driving users would benefit in the long term because recreational opportunities that meet their expectations would be preserved, and the likelihood for satisfying experiences would be maintained.

Impacts from Alternatives A through C

Under Alternatives A, B, and C, the byway would be managed under VRM Class II objectives to beneficially preserve the route's scenic quality. Recreational scenic driving users would benefit in the long term from management action under these alternatives to protect and maintain scenic quality along the byway. Compared to the No Action Alternative, Alternatives A, B, and C would provide similar opportunities for recreational sightseeing as the No Action Alternative because scenic quality would be protected at the same level as under the No Action Alternative.

Impacts from Alternative D

Alternative D actions would manage under VRM Class III objectives, which would permit moderate surface disturbances and contrasts within the byway's viewscape, which would have adverse impacts on sightseeing opportunities along the route and reduce the opportunities for satisfying experiences for scenic motorized recreation. Compared to the No Action Alternative, Alternative D would provide a lesser degree of opportunity because scenic quality would have less protection from potential impacts to the viewscape.

4.3.5.3.4 Impacts of Cave and Karst Actions on Recreation

Impacts from Management Common to All

The No Action Alternative and each of the proposed action alternatives have varying management actions for cave and karst resources, but the impacts to these resources would be the same for recreation resources and resource users: under all of the alternatives, cave and karst resources would be beneficially protected and intensively managed to preserve the resource. This would have long-term, direct, beneficial impacts on the caving specialized user group because opportunities for recreation would be maintained.

4.3.5.3.5 Impacts of Wildland Fire Management Actions on Recreation

Impacts from Management Common to All

Under all of the alternatives, prescribed fires would be conducted within the planning area to maintain and to reduce fuel loads, and wildland fires would be controlled and suppressed as needed to protect resources

and people. The impacts of prescribed burning would be directly and indirectly adverse to all recreation user groups and to recreational opportunities in the short term because access could be limited in areas where controlled burns were being conducted, which would temporarily reduce recreational opportunities for backcountry and front country sightseeing, hiking, camping, biking, caving, and OHV use. The impacts would be indirectly adverse because areas could be closed during vegetation regrowth and because scenic quality could be degraded until vegetation regrowth and visible signs of firefighting operations became less noticeable. In the long term, the impacts to recreation resources and to resource user groups would be directly beneficial because of the reduced risk of wildland fire, and the reduced risk of loss of backcountry and front country facilities. There would also be long-term benefits from improved wildlife habitat and vegetation that would increase the opportunities for wildlife viewing and sightseeing.

4.3.5.3.6 Impacts of Health and Safety Actions on Recreation

Health and safety management actions within the planning area focus on buried and unburied pipelines, subsidence, increased traffic, and on protecting the public from toxic releases of hydrogen sulfide gas and explosive gases generated by oil and gas exploration and development (see Air Resources, Section 0).

Impacts from Management Common to All

Management actions common to all of the alternatives would maintain current strategies for floodplains, hazardous materials, and air quality to ensure public health and safety. Under all of the alternatives, visual and audible alarms would be required for hydrogen sulfide releases. Actions would also continue to comply with BLM procedures to protect public health and safety from toxic and explosive gases. There would be no impacts to recreation resources and user groups as these actions are currently being enforced and would continue to be enforced within the planning area.

4.3.5.3.7 Impacts of Land Tenure Actions on Recreation

Impacts from Management Common to All Action Alternatives

Under all of the action alternatives, the CFO would acquire easements across non-federal lands to provide access for recreation resource needs, including but not limited to river access and areas of high recreation value. This would have long-term, direct, beneficial impacts on all recreation user groups because recreational opportunities would be established in areas not otherwise available or accessible for use.

4.3.5.3.8 Impacts of Land Use Authorizations Actions on Recreation

Impacts from Management Common to All

There are no management actions common to all of the alternatives that would specifically affect recreation. The management of land use authorizations under the proposed alternatives specifically addresses the designation of ROW utility corridors, land use authorizations for future projects within the CFO, and exclusion and avoidance areas for utility and CFO infrastructure. The CFO has proposed minor ROW corridors within the Hay Hollow area (Map 2-31), but the impacts on recreation resources and users cannot be determined at this programmatic level of analysis.

4.3.5.3.9 Impacts of Minerals Actions on Recreation

It can be generally stated that minerals-related management actions would potentially have the greatest impacts on recreation resources and on all user groups. As discussed in Chapter 3, Section 3.3.5, the trend of increased mining activities within the CFO are expected to decrease the quality of recreational opportunities within the planning area that are currently popular for developed and dispersed recreation (e.g., the Hackberry Lake OHV area) because of the large areas that may become available for mining and other minerals development. A brief summary of the existing and proposed acreages and actions being considered are shown below in Table 4-170.

Table 4-170. Minerals Management Actions on Recreation

Minerals Management Actions (acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Oil and Gas Leasing					
Open	1,598,870	1,142,802	1,089,481	1,750,774	1,997,681
CSU (open with moderate constraints)	956,410	799,649	449,759	786,381	631,634
NSO (open with major constraints)	54,602	80,394	162,013	158,401	70,142
Closed	174,391	761,404	1,082,972	88,502	84,687
Total Closed and NSO	228,993 (8.2)*	841,798 (30.23)	1,244,985 (44.72)	246,903 (8.87)	154,829 (5.56)
Total	***2,784,273***	***2,784,248***	***2,784,224***	***2,784,058***	***2,784,145***
RFD (# of wells on lands open to surface disturbance)	5,874	4,465	3,538	5,832	6,044
RFD total acres of surface disturbance from well drilling	11,778	8,547	8,262	11,175	12,129
RFD total acres of surface disturbance after reclamation	8,636	6,565	5,202	8,575	8,887
Recreation buffer areas	No specific management action	No surface disturbance within 0.5 mile of developed recreation sites	Same as Alternative A	No surface disturbance within 0.25 mile of developed recreation sites	Surface disturbance buffer consistent with county/municipal guidelines
Minerals Non-Energy Solid Leasable					
Minerals Locatable					
	No Action Alternative	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Acres open to mineral entry	2,751,856	2,403,114	2,110,098	2,651,855	2,661,705
Acres recommended (or previously recommended for withdrawal)	32,374 (1.16)	380,990 (13.68)	673,996 (24.21)	132,249 (4.75)	122,444 (4.40)
Total	***2,784,229***	***2,784,105***	***2,784,094***	***2,784,104***	***2,784,149***
Minerals Salable					
	No Action	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Open	2,637,465	1,179,104	1,122,020	1,784,431	2,028,324
Avoid (open with moderate constraints)	–	1,043,152	725,368	752,286	602,621
Closed	146,568 (5.3)	561,995 (20.18)	936,799 (33.64)	247,323 (8.88)	153,174 (5.50)
Total	***2,784,033***	***2,784,251***	***2,784,186***	***2,784,041***	***2,784,119***

*The numbers within parentheses are percentages.

Impacts from Management Common to All

Mineral leasing actions common to all alternatives would apply drilling mitigation and design features to the Dark Canyon area north of Carlsbad National Monument to protect the area from the effects of oil and gas drilling. These actions would have direct long-term beneficial impacts on recreation resources and users because high quality scenery would be preserved for all users in the Dark Canyon area.

Impacts from Management Common to All Action Alternatives

There are no minerals-related actions that are common to all of the action alternatives.

Impacts from the No Action Alternative

Under current RMP management actions, oil and gas leasing would be closed or have surface disturbance constraints on 228,993 acres (8.2% of the BLM-administered planning area available for leasing). The remaining 2,555,280 acres (91.8%) would be designated as open and open with moderate surface disturbance constraints (CSU). Approximately 32,374 acres (1.2% of the planning area) would be recommended for withdrawal from locatable mineral use, and 146,568 acres (5.3%) would be closed to salable mineral use. There would be RFD of approximately 5,874 wells within the BLM-administered planning area with a total surface disturbance of 8,636 acres after reclamation. These closures and constraints would reduce surface disturbances and preserve recreation resources by maintaining vegetation, soils, topography, and scenic quality. However, a substantial portion of the planning area would be available for fluid and solid minerals exploration and development, which would have long term adverse impacts on recreation resources and on all resource user groups that have expectations of high scenic quality and naturalness. OHV users would benefit from additional recreational opportunities along drilling and mining access and spur roads. On-road sightseers, water-related users, wildlife viewers, campers, hikers, equestrians, and other non-motorized user groups would be adversely impacted by visually intrusive minerals infrastructure, noise, dust, mining and drilling vehicles from a loss of solitude, quiet, naturalness, and scenic quality.

Impacts from Alternative A

Under Alternative A, oil and gas leasing would be closed or have surface disturbance constraints (NSO leasing) on 841,798 acres (30.23% the BLM-administered planning area), with the remaining 1,942,450 acres designated as open and CSU. Approximately 380,990 acres (13.68%) would be recommended for withdrawal from locatable mineral use, and 561,995 (20.18%) acres would be closed to salable mineral use. There would be RFD of approximately 4,465 wells within the BLM-administered planning area with a total surface disturbance of 6,565 acres after reclamation. Table 4-170 above provides a concise summary of acreages and leasing designations for the proposed action alternatives and the No Action Alternative. This table will allow the reader to compare quantitative and qualitative information between these alternatives. The table is applicable to this alternative and to the other alternatives. The impacts to recreation users and recreation resources would be similar to those discussed under the No Action Alternative because the types of surface disturbances would be the same.

Compared to the No Action Alternative, this alternative would be more beneficial for recreation resources and users because more acreage (612,805 acres of leasable landscape) within the planning area would be protected from leasable minerals-related surface disturbances and visual infrastructure intrusions, with preservation of scenic quality in these areas. Also, 384,616 more acres of locatable minerals landscape and 415,427 more acres of salable minerals landscape would be protected from minerals-related disturbances, with scenic quality protection. Recreational opportunities for all users seeking naturalness, quiet, and a sense of remoteness would be increased by the protection of these landscapes, with the increased likelihood for satisfying experiences.

Impacts from Alternative B

Alternative B management actions would close or have major surface disturbance constraints (NSO) on 1,244,985 acres (44.72% the planning area), with the remaining 1,539,240 acres designated as open and CSU. Approximately 673,996 acres would be recommended for withdrawal from locatable mineral use, and

936,799 acres would be closed to salable mineral use. There would be RFD of approximately 3,538 wells within the BLM-administered planning area with a total surface disturbance of 5,202 acres after reclamation. The impacts to recreation resources and user groups would be similar to those discussed above for the No Action Alternative because the surface impacts would be the same.

Compared to the No Action Alternative, the impacts to recreation would be more beneficial than those discussed for Alternative A because a larger area would be protected from minerals-related surface disturbances with direct, long-term beneficial impacts on recreation resources and users. Approximately 1,015,992 more leasable acres than under the No Action Alternative would be closed or NSO; 641,622 more acres than under the No Action would be closed to locatable minerals use, and 790,231 more acres would be closed to salable minerals use.

Impacts from Alternative C

Management actions under Alternative C would designate approximately 246,903 acres as NSO or closed to minerals leasing (8.87% of the planning area), with the remaining 2,537,155 acres designated as open and CSU. Approximately 132,249 acres would be recommended for withdrawal from locatable mineral use and 247,323 acres would be closed to salable mineral use. There would be RFD of approximately 5,832 wells within the BLM-administered planning area with a total surface disturbance of 8,575 acres after reclamation. The impacts to recreation resources and users would be the same as discussed under the No Action Alternative.

Compared to the No Action Alternative, the impacts to recreation would be more directly beneficial in the long term because more acreage within the planning area would be protected from minerals-related surface disturbances: 17,910 more acres would be closed or NSO than under the No Action Alternative, 99,875 more acres would be closed to locatable mineral use, and 100,755 more acres would be closed to salable mineral use. The impacts from these management actions would be the same as those discussed for Alternative A for the same reasons.

Impacts from Alternative D

Under Alternative D, management actions would designate approximately 154,829 acres as NSO or closed to minerals leasing (5.56% of the planning area), with the remaining 2,629,315 acres designated as open and CSU. Approximately 122,444 acres would be recommended for withdrawal from locatable mineral use, and 153,174 acres would be closed to salable mineral use. There would be an RFD of approximately 6,044 wells within the planning area with a total surface disturbance of 8,887 acres after reclamation. The impacts to recreation resources and users would be the same as discussed under the No Action Alternative.

Compared to the No Action Alternative, this alternative would have fewer beneficial long-term impacts on recreation resources and users and more long-term adverse impacts because there would be less scenic quality protection and more surface disturbance. There would be 74,164 fewer acres protected from minerals-related surface disturbances under leasable NSO and closed designations than under the No Action Alternative. There would be 90,070 more acres protected from locatable minerals use than under the No Action Alternative, but 6,606 fewer acres protected from salable minerals use than under the No Action Alternative.

4.3.5.3.10 Impacts of Livestock Grazing Actions on Recreation

Impacts from Management Common to All

Under all of the alternatives, acreage would be managed as either open or closed to livestock grazing. Closed areas would have long-term, beneficial impacts on all recreation user groups because surface disturbances would be reduced, scenic quality would be preserved, and a higher degree of naturalness would be maintained. Cattle tend to degrade the backcountry recreational experience for hikers, backpackers, primitive backcountry campers, and cavers by the presence of manure on trails and in camping areas, by compacting soil and creating conditions for soil erosion, creating conditions for exotic weeds establishment from surface disturbances, and consuming wildlife forage (that reduces opportunities for wildlife viewing) (see BLM 2008b).

Table 4-171 depicts the acreage designated as open and closed to livestock grazing within the BLM-administered area.

Table 4-171. BLM Grazing Acres

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Open	2,089,394	1,598,198	1,937,725	2,083,232	2,087,759
Closed	1,939	493,120	153,583	8,115	3,594
Total	***2,091,333***	***2,091,318***	***2,091,308***	***2,091,347***	***2,091,353***

Impacts from the No Action Alternative

Management actions for the current RMP would exclude livestock within 1,939 acres or 0.01% of the BLM-administered planning area, with directly beneficial long-term impacts as discussed above.

Impacts from Alternative A

Under Alternative A, 493,120 acres would be closed to grazing (23.57% of the total area available for grazing), with impacts as discussed above. Compared to the No Action Alternative, this alternative would be more beneficial to recreation because more area would be excluded from long-term grazing impacts.

Impacts from Alternative B

Under Alternative B, management actions would close 153,583 acres (7.34% of the planning area) to grazing, with impacts to recreation as discussed above. Compared to the No Action Alternative, this would be more beneficial to recreation resources and all user groups because more acreage would be closed to grazing.

Impacts from Alternative C

The management actions under Alternative C would close 8,115 acres to livestock grazing or 0.39% of the planning area. There would be long-term benefits from this action (as discussed above), but there would be practically no impacts on recreation resources and recreational opportunities because the impacted area would be very small when compared to the total planning area. Compared to the No Action Alternative, this alternative would have more beneficial impacts because more acres would be protected from scenic quality degradation and surface disturbances.

Impacts from Alternative D

Alternative D management actions would close 3,594 acres to grazing (0.17% of the planning area). The impacts would be similar to those discussed for Alternative C because the livestock grazing closed acreages would be similar small when compared to the total planning area.

4.3.5.3.11 Impacts of Lands with Wilderness Characteristics Actions on Recreation

Impacts from Management Common to All

For all of the alternatives, lands with wilderness characteristics would be managed under three levels of activity (see table below): the protection level would maintain wilderness characteristics; the protection/multiple use level would apply varying degrees of protection and multiple use actions to designated wilderness characteristics lands. The multiple use level would manage wilderness characteristics lands with an emphasis on multiple use. Managing designated wilderness characteristics under the multiple use management levels would have beneficial and adverse impacts on resource users because the levels would create recreational opportunities for a range of users, but would also create surface disturbances that would degrade recreational scenic quality. There are no wilderness characteristics lands designated under the No Action Alternative, so these management levels would have no effect on lands under this alternative.

Impacts from Management Common to All Action Alternatives

Lands with wilderness characteristics would be designated and managed under all of the action alternatives. Recreation resources would receive direct, long-term beneficial protection from management actions that restrict surface disturbances to preserve the wilderness values within these areas. These protective actions would include closure of OHV cross-country use (though travel along existing primitive routes within and through these areas would still be allowed), management under VRM Class I and II objectives to preserve high scenic quality, and closure to mineral leasing and mineral materials disposal. The impacts on recreation users would be beneficial in the long term because 1) scenic quality would be preserved within these areas, 2) opportunities for dispersed camping would be available for non-mechanized user groups, and 3) scenic driver, motorized OHV, and mechanized user groups would retain opportunities for travel along limited OHV primitive routes through these areas. As mentioned above, managing these areas for protection and multiple use would be beneficial because it would create opportunities for a range of recreation user groups; however, there would be adverse impacts to recreation if the multiple use levels of management caused degradation of recreational scenic quality. Table 4-172 shown below summarizes the wilderness characteristics management actions. A more detailed impacts analysis follows the table.

Table 4-172. Acres of Lands with Wilderness Characteristics by Alternative and Management Level

Management Level	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Protects wilderness characteristics	0	66,666	47,611	5,119	1,221
Emphasizes other multiple uses while applying some protective management	0	0	18,964	30,595	0
Emphasizes other multiple uses	0	0	0	30,862	65,446

Impacts from the No Action Alternative

Under the No Action Alternative, there would be no lands within the planning area that would be managed to protect lands with wilderness characteristics. There would be no protection for lands with wilderness characteristics within the planning area, and these lands would be managed for other, unspecified resource uses. The impacts to recreation resources and users of that resource would be adverse in the long term as existing trends and conditions within the planning area would likely permit surface disturbances that degrade the scenic quality of these areas and reduce the opportunities for a diverse range of satisfying recreational experiences.

Impacts from Alternative A

Under Alternative A, there would be 66,666 acres managed for protection of wilderness characteristics, with impacts as discussed under Impacts from Management Common to All Action Alternatives. Compared to the No Action Alternative, this alternative would have more beneficial impacts on recreation resources and users because it would manage the most acres within the planning area for the protection of wilderness characteristics and preserve scenic quality for recreational uses.

Impacts from Alternative B

Alternative B actions would manage 47,611 acres for protection of wilderness characteristics and 18,964 acres for protection and multiple use, with impacts as discussed under Impacts from Management Common to All Action Alternatives. Compared to the No Action Alternative, the impacts would be more beneficial to recreation because wilderness characteristics would be preserved in some areas while also creating recreational opportunities.

Impacts from Alternative C

Management actions under Alternative C would provide protection for 5,119 acres of wilderness characteristics areas and 61,457 acres under protection and multiple use management levels, with impacts as discussed under Impacts from Management Common to All Action Alternatives. The impacts, when compared to the No Action Alternative, would be the same as Alternative B.

Impacts from Alternative D

There would be 1,221 acres managed for protection of wilderness characteristics and 65,446 acres managed under protection and multiple use levels. The impacts to recreation would be similar to those discussed under the No Action Alternative because a very small area would be managed to preserve wilderness characteristics.

4.3.5.3.12 Impacts of Noxious Weeds Actions on Recreation

Impacts from Management Common to All

Actions common to all of the alternatives would follow BLM management prescriptions for treating noxious and invasive weed species with herbicides, and mechanical methods. These actions would have no impacts on recreation resources and recreation opportunities for user groups because they would not restrict or limit recreation opportunities in SRMAs or ERMAs.

Impacts from Management Common to All Action Alternatives

Noxious weed management actions under the action alternatives pertain to herbicide use limitations and prohibitions, and herbicide priority use areas (see Appendix L). None of the actions would impact recreation resources or the opportunities of user groups to benefit from those resources.

4.3.5.3.13 Impacts of Renewable Energy Actions on Recreation

Impacts from Management Common to All

Management actions common to all would adopt the BMPs and programmatic policies in the Wind and Solar Energy EIS Records of Decision (BLM 2012a; NREL 2012). These actions would, at the programmatic level of analysis, have no impact on recreation resources, recreation users, and recreation opportunities.

Impacts from Management Common to All Action Alternatives

The encouragement of wind energy development in existing or planned areas of surface disturbance, such as transmission corridors, would be beneficial in the long term for recreation resources and all recreation user groups because scenic quality would be maintained by the concentration of wind energy projects in areas where VRM class objectives allow major changes to the landscape.

Impacts from the No Action Alternative

Under current RMP actions, wind energy projects would be restricted in ACECs, the Carlsbad National Park viewshed, the Guadalupe Scenic Byway, the Guadalupe Escarpment, the face of the Guadalupe Mountains, and in known cave and karst areas. The impacts would be directly beneficial in the long term for recreation resources and users for the same reasons as discussed under Management Common to All Action Alternatives: scenic quality would be preserved, which would maintain recreational opportunities with conditions for satisfying experiences.

Impacts from Alternative A

Under Alternative A, areas within the planning area would be excluded from wind and solar energy development and closed to geothermal development. These areas would include SRMAs, ERMAs, the viewshed of Carlsbad National Park, and known karst areas. The beneficial impacts to recreation would be the same as discussed under Impacts from Management Common to All, but with additional direct, long-term beneficial impacts from preservation of recreational opportunities for all user groups caused by

exclusion of these projects from recreation areas. Compared to the No Action Alternative, this alternative would be more beneficial to recreation because more recreational opportunities would be preserved in the long term, with the greater likelihood for satisfying recreational experiences.

Impacts from Alternative B

The management actions would be the same as Alternative A, except wind energy projects would be avoided (not excluded) from ERMAs. The potential development of wind farms in the planning area ERMAs would have direct, long-term, adverse impacts recreation users that seek backcountry, dispersed, primitive camping, hiking, equestrian, and OHV opportunities. Wind development in the ERMAs would degrade the expectation of these users for naturalness and a sense of solitude. Also, wind energy development would create surface disturbances and degrade scenic quality that is part of the recreation experience. The likelihood for satisfying recreational experiences within ERMAs would be diminished. Compared to the No Action Alternative, this alternative would be more beneficial for the same reasons as discussed under Alternative A.

Impacts from Alternatives C and D

The management actions, as they pertain to recreation, would be the same as discussed under Alternative B, with the same impacts to the resource and to users of that resource.

4.3.5.3.14 Impacts of Riparian Actions on Recreation

Impacts from the No Action Alternative

Current management under the No Action Alternative would prohibit surface disturbances in riparian areas and designate all seeps and springs within the planning area as closed to OHV use and would restrict camping within these areas to ensure the recovery of riparian habitat. These actions would have direct, long-term, adverse impacts on recreation user groups that would potentially recreate in these areas, including OHV users, and primitive and undeveloped backcountry campers. Recreational opportunities would be adversely reduced for these users; however, there would be direct long-term, beneficial impacts on daytime wildlife sightseers because improving seep and spring riparian habitat would increase the opportunities for wildlife viewing.

Impacts from Alternatives A, B, and C

The management actions that affect recreation resources and opportunities would be the same for these alternatives as discussed under the No Action Alternative, with the same adverse and beneficial impacts.

Impacts from Alternative D

Alternative D actions would prohibit surface disturbances within riparian areas, but does not specify OHV use or OHV restrictions or camping restrictions in these areas, except no surface disturbances within seep and spring areas. Compared to the No Action Alternative, these actions would potentially be beneficial in the long term for mechanized OHV users and primitive campers because more opportunities would be available to these user groups. The actions would potentially be adverse in the long term for recreation resources, wildlife viewers and other sightseers because of surface disturbances, and noise and human presence and movement would likely reduce the opportunities for wildlife viewing. Also, Alternative D actions would likely create an adverse, long-term increase in resource user conflicts between non-mechanized sightseers and primitive campers and mechanized OHV users. In the long term, there would be a long-term, adverse reduction in opportunities for non-mechanized users because the conditions for satisfying experiences (that include solitude, quiet, and naturalness) would be reduced.

4.3.5.3.15 Impacts of Special Designations (ACECs) Actions on Recreation

Impacts from Management Common to All

There are no management actions that are common to all alternatives. Table 4-172 briefly summarizes the acreages and designations of the existing and proposed ACECs in the planning area. Note in the analysis below that when a statement includes "limited to designated routes" or "limited to existing routes" that the statement applies to all motorized and mechanized vehicle use.

Table 4-172. Summary of ACEC Designations and Acreages

ACECs	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Blue Springs Riparian Habitat	444-acre ACEC designation on private lands	444-acre, no ACEC designation on private lands	Same as Alternative A	Same as Alternative A	Same as Alternative A
Birds of Prey Grasslands	349,355-acre, no designation as ACEC	349,355-acre designation as ACEC	Same as Alternative A	349,253-acre, same as No Action	349,282, same as No Action
Boot Hill	1,065-acre designation as a CRMA	1,065-acre, no ACEC designation	1,065-acre designation as an ACEC	Same as Alternative A	Same as Alternative A
Cave Resources	19,625-acre SMA designation	19,625-acre designation as an ACEC	Same as Alternative A	Same as Alternative A	Same as Alternative A
Chihuahuan Desert Rivers	108,483-acre, no designation as an ACEC	108,483-acre designation as an ACEC	108,483-acre, no ACEC designation	Same as Alternative B	Same as Alternative B
Chosa Draw	2,797-acre designation as an ACEC	Managed as part of the Cave Resources ACEC	Same as Alternative A	Same as Alternative A	Same as Alternative A
Dark Canyon Scenic Area	1,525-acre designation as an ACEC	Managed as part of the Cave Resources ACEC	Same as Alternative A	Same as Alternative A	Same as Alternative A
Desert Heronries	48,711-acre, no designation as an ACEC	48,711-acre, no designation as an ACEC	48,711-acre designation as an ACEC	Same as Alternative A	Same as Alternative A
Gypsum Soils	65,564-acre, no ACEC designation	625,564-acre, No ACEC designation	65,564-acre designation as an ACEC	Same as Alternative B	Same as No Action
Laguna Plata	4,496-acre, no ACEC designation	4,496-acre designation as an ACEC	Same as Alternative A	Same as No Action	Same as No Action
Lonesome Ridge	2,981-acre designation as an ACEC	3021-acre designation as ACEC	Same Alternative A	Same as Alternative A	Same as Alternative A
Maroon Cliffs	8,659-acre, no ACEC designation	Same as No Action	8,659-acres designated as an ACEC	Same as No Action	Same as No Action
Pecos Bluntnose Shiner Habitat	201-acre designation as an ACEC	Same as No Action	Same as No Action	Same as No Action	Same as No Action
Pecos River/ Canyons Complex	5,688-acre designation as an ACEC	4,115-acre designation as an ACEC	Same as Alternative A	Same as Alternative A	4,115-acre, no designation as an ACEC.

ACECs	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Pope's Well	81-acre, no designation as an ACEC	Same as No Action	81-acre designation as an ACEC	Same as Alternative B	Same as No Action
Salt Playas	49,772-acre, no ACEC designation	Same as No Action	49,772-acre designation as an ACEC	Same as No Action	Same as No Action
Serpentine Bends	5,019-acre, no designation as an ACEC	5,019-acre designation as an ACEC	Same as Alternative A	Same as Alternative A	Same as Alternative A
Seven Rivers Hills	1,027-acre, no designation as an ACEC	Same as No Action	1,027-acre designation as an ACEC	Same as Alternative B	Same as Alternative B
Six Shooter	735-acre, no designation as an ACEC	735-acre designation as an ACEC	Same as Alternative A	Same as No Action	Same as No Action

Impacts from Management Common to All Action Alternatives

Management actions common to all action alternatives would designate four ACECs: Cave Resources, Pecos Bluntnose Shiner Habitat, Lonesome Ridge, and Serpentine Bends ACECs. The impacts would range from no impacts for the Bluntnose Shiner Habitat ACEC (because the area is not managed for recreation) to beneficial for recreation from resource preservation and/or preservation of recreational opportunities (Cave, Lonesome Ridge, and Serpentine Bends ACECs). The specific effects of the proposed action alternatives on these ACECs are discussed below. It should be noted that the format for this subsection has been modified from the other subsections for ease of comparison of effects on the proposed ACECs. The alternatives for each ACEC are compared separately, and not by alternative, so that the reader can more easily see the range of effects on each ACEC.

Blue Springs Riparian Habitat ACEC

No Action Alternative

The 444-acre ACEC is currently under private ownership and surrounded by private lands and is managed to protect the habitat of an endangered fish species. OHV use is currently limited to designated routes, and camping and plant collection are restricted. There would be no impacts to recreation resources and opportunities because the area is not managed for recreation.

Alternatives A through D

Under all of the action alternatives, the ACEC would continue to be managed under the same prescriptions as described under the No Action Alternative. There would be no impacts to recreation resources and users as the area is not managed for recreation and would continue to be managed for habitat protection and very limited surface disturbances.

Birds of Prey Grasslands ACEC

No Action Alternative

Current management actions within the 349,355-acre Birds of Prey grasslands would not be designated as an ACEC, but would include prescriptions that allow limited OHV use, moderate to major surface disturbances under VRM Class III and IV objectives, and open to livestock grazing.

Current management would continue to be beneficial in the long term to motorized OHV users, as this user group would have OHV limited access and recreational opportunities throughout the area. The impacts to non-mechanized hikers, campers, equestrian, wildlife viewers, and sightseers would be adverse because of resource use conflicts between non-mechanized and mechanized user groups. Non-mechanized users would

continue to have reduced opportunities for quiet and solitude, and surface disturbances caused by livestock and OHVs would continue to reduce or degrade the opportunities to experience a natural, undisturbed setting. Also, scenic quality would continue to be adversely degraded for all recreation users from continued, allowed surface disturbances under VRM Class III and IV objectives.

Alternative A

Under this alternative, the area would be designated as an ACEC would be managed with the same area as the No Action Alternative (349,355 acres). The ACEC would be managed with 59,512 acres (17%) under VRM Class I and Class II objectives to protect scenic quality within the ACEC, and 289,829 acres (83%) managed under VRM Classes III and IV. Travel would be OHV limited. The entire area would be closed to livestock grazing.

The impacts on recreation resources would be beneficial in the long term because scenic quality would be protected within the VRM Class I and Class II areas, and there would be no impacts from livestock grazing. There would be long term resource use conflicts between mechanized and non-mechanized user, as discussed under the No Action Alternative. Compared to the No Action Alternative, this alternative would be more beneficial to recreation resources, but the impacts to users would be similar.

Alternative B

The actions under Alternative B would be the same as Alternative A, except that livestock grazing would be open on 99% of the ACEC. The impacts to recreation resources and users would be beneficial from scenic quality protection under VRM Class I and Class II (the same acreages as under Alternative A). The impacts to recreation users would be the same as discussed under Alternative A for the same reasons. Livestock grazing would adversely impact all users for the same reasons as discussed under 4.3.5.3.10 above: degrading scenic quality, reducing wildlife habitat, and creating conditions for invasive species growth. Compared to the No Action Alternative this alternative would be more beneficial because more scenic quality would be protected under VRM I and II objectives.

Alternative C

Under this alternative, the Birds of Prey ACEC would not be designated for the protection of habitat. The impacts to the recreation user groups within the 349,253-acre area would be adverse in the long term from loss of wildlife-viewing opportunities, loss of scenic quality from management under VRM Class III and Class IV objectives, and permitted minerals development within the area. There would be opportunities for satisfying experiences by OHV users on limited routes; however, there would be long-term scenic quality degradation within the ACEC from permitted moderate to major surface disturbances under the VRM objectives that would adversely reduce the quality of the recreational experience for all users. Compared to the No Action Alternative, this alternative would have the same impacts because of the lack of protection as an ACEC.

Alternative D

This alternative would have the similar management actions as discussed for the No Action Alternative, with the similar impacts on recreation resources and users: OHV limited throughout the 349,282-acre area (and no ACEC designation), management under VRM Class III and Class IV objectives, and open to livestock grazing.

Boot Hill District ACEC

No Action Alternative

This 1,065-acre ACEC is currently managed to protect important and sensitive cultural resources for research. Current management includes managing the area under VRM Class IV objectives, livestock grazing is permitted over the entire ACEC, no surface disturbances are allowed until culturally cleared, and OHV travel is limited throughout the ACEC.

There would be no impacts to recreation because the area is not managed for recreation. Recreational opportunities would exist for OHV travel along existing routes.

Alternative A

Under this alternative, the ACEC would not be designated, but managed with the same prescriptions as the surrounding area. These prescriptions would be the same as discussed for the No Action Alternative: open to livestock grazing, OHV limited to existing routes, and scenic quality managed under VRM Class IV objectives.

The impacts to recreation would be the same as the No Action Alternative because the area is not currently managed for recreation and would not be under the revised RMP. There are opportunities for OHV use within the area, but management actions under this alternative would neither enhance nor degrade any existing opportunities or recreation resources.

Alternative B

Under this alternative, the 1,065-acre ACEC would be designated; however, the impacts for recreation would be same as discussed for the No Action because the area is not currently managed for recreation and would not be in the future.

Alternatives C and D

These action alternatives would not designate the Boot Hill ACEC, but the management actions would be the same as the No Action Alternative, and the impacts to recreation resources and recreation users would be the same as discussed for Alternative A.

Cave Resources ACEC

No Action Alternative

Current management prescriptions protect the 19,625-acre area with its 19 caves within nine cave management units. Current management objectives include protection of cave resources scenic quality and other cave natural values while accommodating recreational use. The area is open to livestock grazing. Limited OHV travel is permitted on 18,237 acres (93% of the ACEC). Scenic quality VRM Class I and Class II objectives protect 6,837 acres (35%), and the remaining acreage is managed under VRM Class III and IV objectives for moderate to major surface disturbances.

The impacts to recreation resources would be directly beneficial in the long term for specialized caving opportunities because the ACEC area is managed for this resource. Motorized OHV users would also directly benefit from these management prescriptions because the majority of the area allows limited OHV recreational opportunities. Other non-mechanized resource users (hikers, campers, equestrians, sightseers) would be adversely affected in the long term because of resource use conflicts between mechanized and non-mechanized users, and because the majority of the area is managed to permit substantial surface disturbances and degradation of surface scenic quality. Non-mechanized opportunities for scenic quality, quiet, naturalness, and a sense of isolation and remoteness would be adversely degraded in the long term by livestock grazing surface disturbances and OHV noise.

Alternative A

Under this alternative, the 19,625-acre ACEC would manage 14,630 acres under scenic quality protecting VRM Class I and II objectives (75% of the ACEC). Approximately 4,516 acres would be closed to livestock grazing, and OHV limited access would be the same as the No Action (96% of the area).

The actions would have long-term beneficial impacts on recreation resources and users from scenic quality protection under VRM Class I and Class II objectives. Specialized caving users would be beneficially impacted and OHV users in the long term by prescriptions that protect cave and karst features and the areas surrounding these features and OHV limited use throughout the ACEC; however, there would be adverse user conflicts between mechanized OHV and non-mechanized users as discussed under the No Action Alternative. Compared to the No Action Alternative, this alternative would be more beneficial in the long term for all users because more opportunities would be available for more recreation users, more areas would be protected for scenic quality, and resource conflicts would be reduced.

Alternatives B through D

Under these action alternatives, management actions would be the same as those discussed under Alternative A, with the same impacts as discussed for that alternative.

The impacts would be beneficial to all users who seek recreational opportunities within the ACEC because scenic quality would be enhanced in the long term. Compared to the No Action Alternative, these alternatives would have the same impacts on recreation resources and user groups as discussed under Alternative A for the same reasons.

Carlsbad Chihuahuan Desert Rivers ACEC

No Action Alternative

The 108,483-acre area would not be managed as an ACEC for scenic quality protection associated with the Guadalupe Escarpment. Management actions include OHV limited travel on 101,820 acres (94% of the area), livestock grazing on 102,056 acres (94% of the ACEC), and managing 106,007 acres (98% of the area) under VRM Class III and IV for moderate to major surface disturbances to the scenic landscape (2% managed under VRM Class II).

The impacts of these actions would be adverse in the long term for recreation resources and for all users because scenic quality degradation would be permitted on a substantial portion of the area from livestock grazing and other surface disturbances. Non-mechanized recreation user groups would be adversely affected by resource use conflicts with OHV users that would degrade their opportunities for satisfying experiences. The OHV-related adverse effects would include noise and visual and physical intrusions that would reduce the likelihood for solitude, quiet, naturalness, and a sense of isolation.

Alternative A

The ACEC would be designated under this alternative. Management prescriptions would exclude livestock grazing within the 108,483-acre ACEC, and limit OHV recreation to 101,880 acres (94% of the ACEC). The area would continue to be managed under VRM Class III and IV objectives on 96,242 acres (89% of the ACEC) for moderate to major surface disturbances to the landscape, and VRM Class II objectives for scenic preservation on the remaining 11%. Management prescriptions would limit camping or close some areas to camping and use minerals BMPs to protect scenic values.

The impacts to recreation resources would be adverse in the long term because scenic quality in most of the ACEC would continue to degrade from permitted surface disturbances, and the impacts to resource users would be the same as discussed for the No Action Alternative for the same reasons. Compared to the No Action Alternative, this alternative would be more beneficial to recreation resources because more area would be protected under VRM Class II objectives and there would be greatly reduced surface disturbance-related impacts from livestock grazing.

Alternative B

The ACEC would not be designated under this alternative, but the 108,483-acre area would be managed similar to the surrounding area. Approximately 28,138 acres (26%) of the area would be managed under VRM Class II objectives to preserve scenic quality, and 80,333 acres (82%) managed for surface disturbances under VRM Class III and Class IV objectives. Livestock grazing would be excluded on 63,371 acres (58% of the area), and OHV travel would be limited on 101,880 acres (94% of the area).

The impacts to recreation resources would be beneficial in the long term because a substantial portion of the area would be protected under VRM Class II to maintain and improve scenic quality. The impacts to mechanized and non-mechanized users would be the same as discussed under Alternative A for the same reasons. Compared to the No Action Alternative, this alternative would be more beneficial for the same reasons as discussed under Alternative A.

Alternatives C and D

These alternatives would allow grazing on 95% and 99% of the area, respectively (the ACEC would not be designated under these alternatives), OHV travel would be limited (the same as discussed under Alternative B), and the landscape would be predominantly managed under VRM Class III and IV objectives (91,547 acres or 88% of the area). Scenic quality protection under VRM Class II would apply to the remaining 12% of the area.

The impacts to recreation resources would be similar to those discussed under Alternative A because the acreage managed under VRM Class III and IV would be similar and the acreage managed for limited OHV use would be similar, with similar levels of permitted surface disturbances. The impacts to recreation users would be similar to Alternative A for the same reasons. Permitting livestock grazing on the area would be adverse in the long term for non-mechanized users because (as discussed in the Livestock Grazing and Recreation subsections) cattle tend to degrade the backcountry recreational experience for hikers, backpackers, primitive backcountry campers, and cavers by the presence of manure and by compacting soil and creating conditions for soil erosion, creating conditions for exotic weeds establishment from surface disturbances, and consuming wildlife forage (that reduces opportunities for wildlife viewing). Compared to the No Action Alternative, these alternatives would be more beneficial for recreation resources and users because more area would be protected for scenic quality preservation under VRM Class II objectives.

Chosa Draw ACEC

No Action Alternative

The 2,797-acre Chosa Draw ACEC is currently being managed to protect sensitive karst resources that include significant caves, sinking streams, springs, and sink holes. The area is also managed for cave-recreation, scientific research, and education. Management actions for the No Action Alternative are discussed under the Cave Resources ACEC No Action Alternative because this area lies within that proposed ACEC boundary.

Alternatives A through D

For all of the action alternatives, the Chosa Draw ACEC area would be managed as part of the proposed Caves Resources ACEC. The impacts to the Chosa Draw area and comparisons with the No Action Alternative are discussed under that ACEC subsection.

Dark Canyon Scenic Area ACEC

No Action

The 1,525-acre Dark Canyon Scenic ACEC is currently being managed to protect the area's highly sensitive visual values, natural values, fragile caves, and threatened and endangered plant species. As mentioned above for Chosa Draw ACEC, management actions for the No Action Alternative include those prescriptions that are discussed under the Cave Resources ACEC No Action Alternative because this area lies within that proposed ACEC boundary.

Alternatives A through D

For all of the action alternatives, the Dark Canyon Scenic ACEC area would be managed as part of the proposed Caves Resources ACEC. The impacts to the Dark Canyon Scenic area and comparisons with the No Action Alternative are discussed under that ACEC subsection.

Desert Heronries ACEC

No Action Alternative

This area is currently being managed with the objectives of preserving and protecting important and sensitive cultural resources for research and protecting active heronries. Current management of this 48,711-acre area would allow livestock grazing, allow OHV limited travel on 48,393 acres (99% of the area), and manage scenic quality under VRM Class III (720 acres or 2%) and 47,991 acres under VRM Class IV objectives (98% of the area). The impacts to recreation resources would be adverse because the area

would not be managed to protect scenic qualities or prevent surface disturbances. Recreation OHV users would continue to benefit from travel opportunities, but there would be no beneficial impacts for other recreational resource users because the area is not specifically managed for recreational opportunities, the focus of management is resource preservation, and recreation opportunities would be neither enhanced nor diminished by the area's management prescriptions.

Alternatives A, C, and D

The 48,711-acre area would not be designated as an ACEC under Alternatives A, C and D, but would be designated under Alternative B (see below). Management prescriptions would maintain the area as open to livestock grazing on 74% to 99% of the area, but limit OHV travel. Approximately 98% of the area would be managed under VRM Class IV objectives (the same as the No Action Alternative) for major surface disturbances, with the remainder under VRM Class III objectives. The impacts would be the same as discussed for the No Action Alternative because surface disturbances and the opportunities for recreation would be similar. Compared to the No Action Alternative, these alternatives would have similar impacts to recreation resources and users in the long term because the area would be managed with similar prescriptions.

Alternative B

Under this alternative, the 48,472-acre Desert Heronries ACEC would be designated for the protection of great blue heron nest colonies. The impacts to recreation users would be the same as discussed for the above action alternatives because the area is not currently managed for recreational opportunities, but for habitat preservation.

Gypsum Soils ACEC

No Action Alternative

The 65,564-acre Gypsum Soils area would not be managed to protect visual resource values associated with the Guadalupe Escarpment while accommodating other resource uses. Current prescriptions include limited OHV travel on 60,009 acres (92% of the area), scenic quality management under VRM Class III and Class IV on 59,146 acres (90% of the area), and the remaining acres managed under VRM Class II. Livestock grazing would be permitted on 92% of the area (60,445 acres). The impacts on recreation resources and user groups would be similar to those discussed for Serpentine Bends below: OHV limited users would benefit from travel opportunities throughout the area, but non-mechanized user groups (hikers, campers, equestrians, sightseers, wildlife viewers) would be adversely affected in the long term because of resource use conflicts between OHV mechanized and non-mechanized users, and because the majority of the area is managed to permit substantial surface disturbances and degradation of surface scenic quality under VRM Class III and Class IV and livestock grazing. Non-mechanized opportunities for scenic quality, quiet, naturalness, and a sense of isolation and remoteness would be adversely degraded in the long term by livestock grazing surface disturbances and OHV noise and visual intrusions. The likelihood for non-mechanized groups to have satisfying experiences would continue to be diminished.

Alternative A

Under Alternative A, the ACEC would not be designated, but OHV travel would be limited on 60,072 acres (or 92% of the area) within the 65,562-acre area. Livestock grazing would be closed in 92% of the area (60,534 acres). Approximately 50,679 acres (77% of the area) would continue to be managed under VRM Class III and IV objectives (with the remainder [11,995 acres] managed under VRM Class II objectives) that permit moderate to major changes to the visual landscape. The impacts to recreation resources would be adverse in the long term because moderate to major surface disturbances would continue to be allowed on a substantial portion of the area (an area whose resource objective is scenic quality protection). The impacts to OHV resource users of the area would be beneficial in the long term because opportunities for OHV travel would be available. The impacts to non-mechanized and specialized user groups would be adverse for the same reasons as discussed under the No Action Alternative for the same reasons. The reduction in livestock grazing would reduce surface disturbances and benefit all user groups. Compared to the No Action Alternative, this alternative would be more beneficial for recreation resources because more area would be protected to preserve scenic quality under VRM II than under the No Action Alternative.

Alternative B

Under this alternative, the 65,564-acre Gypsum Soils ACEC would be designated. Management prescriptions would include closing all of the ACEC to grazing, and provide limited OHV use on 92% of the landscape (the same as Alternative A). Under this alternative, 25,993 acres (40% of the ACEC) would be managed under VRM Class II objectives to preserve scenic quality, with the remaining 60% managed under VRM Class III and Class IV objectives. Compared to the No Action Alternative, this alternative would be more beneficial to recreation resources in the long term because, in addition to the benefits discussed above under Alternative A, a substantial portion of the ACEC's scenic quality would be maintained in the long term under VRM Class II, which would enhance the recreational experience for all recreation resource users of the ACEC.

Alternative C

Under this alternative, the 65,564-acre ACEC would be designated and management prescriptions would be similar to those discussed under Alternative A: similar acreage managed under VRM Class III and IV (53,530 acres or 82%) and similar acreage managed for limited OHV use (61,028 acres). However, this alternative would permit livestock grazing on approximately 57,405 acres of the ACEC (88%). The impacts to recreation resources and users would be adverse in the long term because surface disturbances caused by livestock and permitted moderate to major alterations of the landscape under VRM objectives would diminish and degrade scenic quality. Compared to the No Action Alternative, these action alternatives would be less adverse because more acres under VRM Class II objectives would protect scenic quality within the ACEC.

Alternative D

Under Alternative D, the 65,564-acre area would not be designated as an ACEC (same as Alternative A). The acreage of the area managed under VRM Class III and IV objectives would be similar to Alternative A, 50,638 acres or 77%. Similar acreage would be managed for limited OHV use, 60,967 acres (93%). Livestock grazing would be permitted on 60,905 acres (93% of the area). The impacts to recreation resources and users would be similar to those described under Alternative C for the same reasons: long term adverse impacts caused by surface disturbances permitted under VRM Class III and Class IV, and livestock grazing. Compared to the No Action Alternative, the impacts would be the same as discussed under Alternative C for the same reasons.

Laguna Plata ACEC

No Action Alternative

Under current management, the 4,496-acre Laguna Plata area would not be designated as an ACEC, but managed to protect important and sensitive cultural resources. Under this alternative, the area would be closed to OHV travel on 3,010 acres (67%) with the remainder as OHV limited. Surface disturbances are restricted, and there are no prescriptions that pertain to recreational use. The area would be managed under VRM Class III and Class IV objectives that allow moderate to major surface disturbances and scenic quality impacts. There would be no impacts to recreation resources and users because the area is not managed for that resource use.

Alternatives A and B

Management actions under these alternatives would designate and manage the 4,496-acre ACEC to preserve sensitive and important cultural resources. The management prescriptions would be the same as the No Action Alternative, except that the entire area would permit OHV limited travel. Alternative B would close the ACEC to livestock grazing. Compared to the No Action Alternative, there would be more beneficial to OHV users because OHV opportunities would be available. There would be no impacts to other users because recreational activities would still be very limited.

Alternatives C and D

Under this alternative, the management actions would be the same as the No Action Alternative. The impacts to OHV recreation would be the same as discussed for the other action alternatives because the opportunities for recreation would be the same.

Lonesome Ridge ACEC

No Action Alternative

Under current management prescriptions, the 2,981-acre Lonesome Ridge ACEC is managed to preserve the geologic feature's scenic quality and other natural values. The area would be closed to OHV use except for OHV limited recreation on 41 acres, VRM Class I objectives would be applied to 2,940 acres (99% of the ACEC) with the remainder managed under VRM Class II, and surface disturbances within the ACEC would be restricted. The area would be open to livestock grazing. These actions would be adverse in the long term for mechanized OHV users because opportunities would be limited, but beneficial to non-mechanized backcountry users that seek opportunities for primitive backcountry hiking, sightseeing, and wildlife viewing. The impacts to recreation resources would be beneficial because the area's scenic quality would be preserved.

Alternatives A, C, and D

Management actions under these alternatives would designate the 3021-acre ACEC with management actions similar to the No Action Alternative: the entire ACEC would be managed under VRM Class I objectives to preserve scenic quality, OHV recreation would to be closed in the ACEC, and livestock grazing would be permitted on the ACEC. The impacts to recreation resources would be beneficial in the long term because scenic quality would be preserved, though there would be adverse surface-disturbance impacts caused by livestock grazing. The impacts to recreation users would be the same as discussed under the No Action Alternative for the same reasons: adverse impacts to OHV users from limited opportunities, but beneficial impacts to other users. Compared to the No Action Alternative, the impacts under this alternative would be more adverse for OHV users because opportunities for OHV recreation would be eliminated.

Alternative B

Management of the 3021-acre ACEC would be the same as the other action alternatives, except that 41 acres would be managed as VRM Class II. The impacts to recreation would be the same as discussed for Alternative A. When compared to the No Action Alternative the impacts would be the same as discussed under Alternative A because the management actions are the same.

Maroon Cliffs ACEC

No Action Alternative

The 8,659-acre Maroon Cliffs area is currently managed to protect and preserve important cultural resources for research. Livestock grazing is permitted, and the area allows OHV limited travel throughout. Surface disturbances are restricted to prevent impacts to cultural resources, and the site is managed entirely under VRM Class III objectives (with the exception of four acres under VRM Class IV). The impacts to recreation under this alternative would continue to be beneficial in the long term for OHV recreation because opportunities for limited OHV travel throughout the site would not be impaired. There would be no impacts to other, non-mechanized users or recreation resources because the area is currently managed for cultural resource preservation and protection and that management objective would continue, so these other opportunities would neither be impaired nor enhanced.

Alternative A

Management actions for this alternative would not designate the Maroon Cliffs ACEC (the same as the No Action Alternative), but would continue management prescriptions similar to the No Action Alternative: OHV limited travel would be allowed throughout the area, and the area would be open to livestock grazing. Actions under this alternative would manage the site under VRM Class III and Class IV objectives (the same as the No Action). The impacts to recreation would be the same as the No Action Alternative, as OHV use would be available throughout the site on routes, and non-mechanized opportunities would be restricted to prevent surface disturbances.

Alternative B

Management actions under this alternative would designate the 8,659-acre area as an ACEC and manage the ACEC area under VRM Class II objectives. The ACEC would be closed to livestock grazing. The long-term impacts to recreational opportunities would be the same as those discussed under the No Action Alternative, but recreation resources would be enhanced by long-term improvements in scenic quality under VRM Class II. Compared to the No Action Alternative, this alternative would be more beneficial because there would be more scenic quality preservation and less surface disturbance.

Alternatives C and D

These alternatives would have the same management actions as Alternative A, with the same impacts to recreation resources and users.

Pecos Bluntnose Shiner Habitat ACEC

No Action Alternative

Currently, this 201-acre ACEC is managed to protect and enhance the habitat for an endangered fish species. Camping and plant collection is restricted, and OHV use is limited throughout the ACEC. The area is open to livestock grazing, and managed under VRM Class IV objectives. There would be no impacts to recreation because the area is managed for species protection, not recreational use.

Alternatives A through D

Under all of the action alternatives, the 201-acre habitat would be designated as an ACEC for the protection of a fish species. The management actions for all of the action alternatives are the same: management under VRM Class II objectives, OHV travel is limited, and closed to livestock grazing. There would be no impacts to recreation resources and users because the area is not currently managed for recreational use under the No Action Alternative and would not be managed for recreation under the action alternatives. There would potentially continue to be opportunities for OHV travel within the area, but the opportunities would be neither enhanced nor reduced from current conditions.

Pecos River/Canyons Complex ACEC

No Action Alternative

This 5,688-acre designated ACEC would be managed to protect sensitive cultural, natural, and scenic values. Management actions include designation as VRM Class II for scenic quality protection and preservation. Within the ACEC 4,730 would be OHV limited (83% of the ACEC)and the remaining 942 acres as closed to OHV use. Livestock grazing would be permitted on all of the ACEC. Long-term beneficial opportunities would continue for OHV travel. Non-mechanized recreation users would be adversely affected in the long term by resource use conflicts with mechanized users from OHV noise and physical intrusion, and with a loss of opportunities for solitude and quiet. There would be long-term, beneficial impacts to recreation resources and users from scenic quality preservation under VRM II and maintenance of a sense of naturalness.

Alternatives A and B

Under these alternatives, the 4,115-acre area would continue to be managed as an ACEC. The ACEC would be managed under VRM Class II objectives, which would be beneficial in the long term for recreation resources and all users because of scenic quality protection. Livestock grazing would be permitted on 83% and 84% of the ACEC and OHV limited travel would be allowed throughout the ACEC, which would have long-term, beneficial impacts on OHV users by maintaining OHV recreational opportunities. However, non-mechanized and specialized user groups would be adversely affected in the long term from resource use conflicts with mechanized OHV users (same as the No Action Alternative) and livestock grazing surface-disturbance impacts. Compared to the No Action Alternative, this alternative would be more beneficial to recreation resources in the long term because applying VRM II management objectives throughout the ACEC would preserve scenic quality to a greater degree.

Alternative C

Under this alternative, the 4,115-acre area would be managed as an ACEC. Management actions would be the same as under Alternative A, except that less area would be managed under VRM Class II (2,276 acres or 55%) and Class III objectives (1,839 acres). The area would be open to livestock grazing, and the area would permit OHV limited travel throughout the ACEC. There would be long-term, adverse impacts to recreation resources from degradation of scenic quality within Class III areas and from grazing that would affect all non-mechanized recreation users who consider high quality scenery to be a component for satisfying recreational experiences. There would be beneficial impacts to OHV users from maintained opportunities for recreation experiences. Compared to the No Action Alternative, this alternative would have the same impacts on resource users for the same reasons: beneficial impacts for OHV users and adverse impacts for non-mechanized users. Recreation resource scenic quality would be more adversely impacted because visual quality preservation would be reduced.

Alternative D

Under this alternative, the area would not be managed as an ACEC, but would have management actions that are the same as Alternative C: management under VRM II Class objectives (2,276 acres) and Class III objectives (1,839 acres), open to grazing, and limited OHV travel. The impacts to recreation resources and users would be the same as discussed under Alternative C because the actions are the same.

Pope's Well ACEC

No Action Alternative

The 81-acre ACEC is currently managed as a historic site. The area is closed to OHV travel and closed to livestock grazing. The area is managed under VRM Class IV objectives. The impacts to recreation would continue to be beneficial in the long term for on-road motorized sightseers and scenic drivers who seek opportunities to visit developed, cultural interpretive and historic sites. There would be no impacts to other resource users because the area is not managed for other recreational users.

Alternatives A, B, C, and D

These alternatives would have management actions similar to those for the No Action Alternative, with the same long-term impacts on recreation resources and user groups. The impacts to recreational opportunities would be the same as those discussed for the No Action Alternative because the same restrictions on travel, livestock grazing, and recreation would apply. Alternatives B and C would designate the area as an ACEC, but management actions under all of the action alternatives would have the same impacts on recreation resources and users because the actions are the same.

Salt Playas ACEC

No Action Alternative

The 49,772-acre Salt Playas area would be managed to preserve and protect important and sensitive cultural resources. Under this alternative, the site is designated as OHV limited on 46,189 acres (93% of the area) and closed to OHV use on the remaining 7% of the area. Approximately 91% of the area (45,258 acres) is managed for major scenic quality modifications under VRM Class IV objectives, and the remaining 9% is managed under VRM Class III objectives for moderate surface modifications. The site is open to livestock grazing. Opportunities for a range of OHV travel recreation would continue to be beneficial for this resource group in the long term, but opportunities for non-mechanized recreation users would be adversely limited. The impacts to recreation resources and to all users would be adverse because VRM Class III and Class IV objectives would permit moderate to major surface disturbances which would degrade scenic quality.

Alternative A

Under Alternative A the Salt Playas would not be designated as an ACEC. Management actions under this alternative would be similar to those under the No Action Alternative because management prescriptions would be similar, with similar impacts to recreation resources and user groups.

Alternative B

Under this alternative, the Salt Playas ACEC would be designated within a 49,772-acre area. Scenic quality management would be approximately the same as Alternative A, as well as livestock grazing and restrictions on OHV use. The impacts on recreation would be the same as discussed under Alternative A.

Alternatives C and D

These alternatives would have the same management prescriptions as Alternative A (as they pertain to recreation), including not designating the area as an ACEC. The impacts to recreation would be the same as discussed under Alternative A.

Serpentine Bends ACEC

No Action Alternative

Current management actions for the 5,019-acre Serpentine Bends area include protecting scenic quality on 3,892 acres (78% of the area) under VRM Class II objectives and 638 acres (13%) under VRM Class I objectives, managing the area as OHV limited on 3,578 acres (71% of the area), and permitting livestock grazing throughout the area. The impacts to recreation resources would be beneficial from managing the area to protect and maintain scenic quality under the VRM objectives. The impacts to recreation users under these management prescriptions would be variable: motorized OHV users would continue to directly benefit from these management prescriptions in the long term because OHV recreational opportunities would be available. Other non-mechanized and specialized resource users (rock climbers, hikers, campers, equestrians, sightseers, wildlife viewers) would be adversely affected in the long term because of resource use conflicts between mechanized and non-mechanized users. Non-mechanized opportunities for scenic quality, quiet, naturalness, and a sense of isolation and remoteness would be adversely degraded in the long term by livestock grazing surface disturbances, and OHV noise and visual intrusions. The likelihood for these non-mechanized and specialized groups to have satisfying experiences would continue to be diminished.

Alternatives A through D

Under all of the action alternatives, the 5,019-acre area would be designated as the Serpentine Bends ACEC. Under all of these alternatives, OHV travel would be limited on 3,578 acres (71% of the designated ACEC) with the remainder of the area closed to OHV use (the same as the No Action Alternative). High levels of scenic quality protection would be maintained under VRM Class I and II objectives. The management prescriptions under all of the action alternatives are similar to those described for the No Action Alternative. Compared to the No Action Alternative these alternatives would have more beneficial impacts on recreation resources and users because more area would be protected under VRM Class I and Class II objectives than under the No Action Alternative (which would manage 492 acres under VRM Class III).

Seven Rivers Hills ACEC

No Action Alternative

Under current planning actions, this 1,027-acre area is managed to protect and enhance habitat for a threatened plant species. The area's scenic quality is protected under VRM Class II objectives on 644 acres (63% of the ACEC) and the remaining 310 acres (37%) are designated as VRM Class III and Class IV, and open to livestock grazing. The area is designated as OHV limited, and camping and surface disturbances are restricted. There would be no impacts to recreation resources and non-OHV resource users under this alternative because the area is not managed for recreational use. Recreational opportunities for OHV limited travel exist within the area and would benefit mechanized user groups, but other recreational opportunities are restricted Managing the area under VRM Class II would beneficially preserve scenic quality within two-thirds of the area, but scenic quality would be adversely degraded within the designated VRM Class III and Class IV areas.

Alternative A

Management actions under Alternative A would not designate the 1,027-acre area as an ACEC. Management prescriptions would include managing the area under the same VRM objectives as the No Action Alternative, permit livestock grazing on the entire area, and limit travel to existing OHV routes. The impacts to recreation resources and users would be the same as discussed under the No Action Alternative because the area would not be managed for recreation.

Alternatives B and C

Under these alternatives, management actions would designate the 1,027-acre ACEC for plant species protection. Under these alternatives, the ACEC would be managed entirely under VRM Class II objectives that would preserve scenic quality. OHV use would be allowed on existing routes throughout the ACEC. The area would be open to livestock grazing. Compared to the No Action Alternative, these alternatives would have the same impact on recreation users because recreational opportunities would be available for mechanized use (motorized OHV use and non-motorized bicycles). The impacts on recreation resources would be more beneficial than the No Action Alternative because the entire ACEC would be managed to preserve scenic quality under VRM Class II objectives.

Alternative D

Management actions under Alternative D would be the same as Alternatives B and C, except the ACEC would be managed entirely under VRM Class III objectives, which would permit moderate surface disturbances. The impacts would be adverse in the long term for recreation resources and users because scenic quality would be degraded for those recreation users who seek OHV opportunities in the ACEC. Compared to the No Action Alternative, the impacts to users would be the same in the long term because a similar range of recreational opportunities would be available users, but less beneficial for recreation resources because the entire ACEC would be managed under VRM Class III.

Six Shooter

No Action Alternative

This area is managed for protection of its high scenic quality. Under current management action, the Six Shooter area is not managed as an ACEC. However, current management actions for the area permit livestock grazing on the 735-acre area. The area is designated for limited OHV use, and the entire area is managed for scenic quality protection under VRM Class II objectives. The impacts to recreation resources would be adverse in the long term because, though VRM objectives would prohibit obvious surface disturbances, grazing would degrade scenic quality from soil compaction, vegetation loss, and soil erosion. The impacts to recreation users would be similar to the discussion for the Pecos River/Canyons Complex ACEC: long-term beneficial opportunities would continue for mechanized OHV travel by permitting recreational OHV opportunities. Non-mechanized recreation users would be adversely affected in the long term by resource use conflicts with mechanized users from OHV noise and physical intrusion, with a loss of opportunities for solitude and quiet. All resource users would continue to be adversely impacted by livestock grazing throughout the relatively small area with long-term, adverse degradation of scenic quality and loss of a sense of naturalness.

Alternative A and B

Under these alternatives, the 735-acre area would be designated as an ACEC. The ACEC would be managed under VRM Class II objectives that would allow only minor disturbances to the landscape, recreational OHV use would be limited, and livestock grazing would continue to be permitted throughout the ACEC. The impacts would be the same as those discussed for the No Action Alternative because the management prescriptions are the same.

Alternatives C and D

Under these alternatives, the 735-acre area would not be designated as an ACEC. However, these alternatives would have management prescriptions similar to the No Action Alternative: the site would be open to grazing, managed under VRM Class II, and would limit OHV use. The impacts to recreation resources and users would be the same as discussed for that alternative.

4.3.5.3.16 Impacts of Special Designations (RNAs) Actions on Recreation

Impacts from Management Common to All

There are no actions common to all of the alternatives.

Impacts from Management Common to All Action Alternatives

The management actions common to all of the action alternatives would be that the currently designated RNAs would not be designated in the revised RMP. There would be no impacts to recreation for the same reasons as discussed under the No Action Alternative: the areas are not currently used for recreation and under the revised RMP would be used for other resource purposes. Those RNAs managed under the 1988 RMP and carried forward in this revised plan would be managed under existing and proposed ACECs (see Special Designations section for a detailed discussion of these areas). For example, the 493-acre Dry Cave RNA would be managed under the Cave Resources ACEC.

4.3.5.3.17 Impacts of Special Designations (SMAs) Actions on Recreation

Impacts from Management Common to All

There are no actions common to all of the alternatives.

Impacts from Management Common to All Action Alternatives

Similar to the impacts discussed above for RNAs, the management actions common to all of the action alternatives would be that the currently designated SMAs would not be designated in the revised RMP.

There would be no impacts to recreation for the same reasons as discussed under the No Action Alternative: Dark Canyon, Potash Bull Wheel, and Bear Grass Draw are currently used for a variety of resource uses, including recreation, and under the revised RMP these areas would continue to be managed to protect recreation resources and uses, but without the SMA designation (see ACECs and Recreation subsections). As mentioned above for the RNAs, those SMAs managed under the 1988 RMP and carried forward in this revised plan would be managed under existing and proposed ACECs (see Special Designations section) for a detailed discussion of these areas). For example, the 27,254-acre Phantom Banks Heronries SMA would be managed under the Desert Heronries ACEC.

4.3.5.3.18 Impacts of Special Designations (WSRs) Actions on Recreation

Impacts from Management Common to All

Under all of the alternatives, if Congress legislates that a river segment is designated as part of the NWSRS, then protection is removed for that river segment and management of the river segment would be according to other management actions within the RMP.

Impacts from the No Action Alternative

Current management under the No Action Alternative would not manage rivers segments along the Delaware and Black Rivers under the NWSRS; however, the Delaware and Black Rivers would be managed as eligible under the NWSRS until suitability determinations are made during the RMP process. The impacts to recreation resources and users would be directly and indirectly beneficial because these waterways would be protected and maintained for their scenic or wild characteristics. The recreational opportunities for satisfying river-related experiences would be maintained over time from river protection under current management actions. Recreational groups most likely affected would be hikers, wildlife viewers, campers, river users, and OHV users.

Impacts from Alternative A

Under Alternative A, 8.22 miles of the Delaware River would be recommended for inclusion in the NWSRS with a tentative classification as Scenic. Additionally, sections of the Black River (3.67 miles within the planning area) would be recommended for inclusion in the NWSRS with a tentative classification as Scenic.

The impacts would be directly beneficial in the long term for recreation resources and user groups mentioned above in the No Action Alternative because scenic quality would be maintained, recreational opportunities would be preserved, and there would be the likelihood for satisfying river-related experiences along the protected Delaware and Black River segments. Compared to the No Action Alternative, this alternative would be more beneficial to recreation because of the long-term increased recreational opportunities that would be available.

Impacts from Alternatives B, C, and D

Management actions under these alternatives would be the same. The 3.67 miles of the Black River would be recommended for inclusion in the NWSRS, but the Delaware River would not be recommended for inclusion in the NWSRS. The impacts on recreation from the Black River NWSRS recommendation would be same as Alternative A for the same reasons, but there would be a potential loss of and long-term adverse impacts on river-related recreational opportunities along the Delaware River from a lack of protection of river scenery. Compared to the No Action Alternative, these alternatives would be more adverse because some scenic protection would be applied to the Black River, but river resources protection along the Delaware River would be reduced.

4.3.5.3.19 Impacts of Special Designations (WSAs) Actions on Recreation

Impacts from Management Common to All

Under all of the alternatives, the four WSAs within the planning area would continue to be managed under BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c). Management would continue until Congress releases these areas from wilderness review. Maintaining these special designation areas in an unimpaired condition would continue to be directly beneficial to non-mechanized recreation user groups (hikers, wildlife sightseers, primitive backcountry and dispersed campers, and cavers) in the long term because the pristine, natural condition of the WSAs would be maintained for these types of recreational opportunities. Continued management would be directly adverse in the long term for mechanized and route-oriented user groups (on-road sightseers and scenic drivers, OHV users, and rock climbers) because mechanized use in the WSAs would be prohibited, visible surface disturbances would be prohibited, and travel through the areas would be limited to primitive routes so that wilderness suitability would not be impaired.

4.3.5.3.20 Impacts of Special Status Species Actions on Recreation

Impacts from Management Common to All

Management actions common to all of the alternatives would stipulate that New Mexico and federal agencies be consulted prior to any projects that may affect special status species in the planning area. Also, state-listed species would be protected through cooperative agreements with New Mexico state agencies. These actions would have no impacts on recreation resources and user groups. There would be no impacts because the management actions are regulated by the Endangered Species Act, and the provisions in that act do not have obvious impacts on recreational resources, recreational opportunities, and resource users. The protection of habitat, the implementation of species recovery plans and conservation agreements, HMP development, Section 7 consultations, project-level habitat protection and mitigation, and the prohibition of surface-disturbing activities around established buffers for protected plant, fish, and wildlife species would not, at this programmatic level of analysis, enhance, impair or restrict recreational opportunities within the planning area.

4.3.5.3.21 Impacts of Travel Management Actions on Recreation

Impacts from Management Common to All

Management common to all of the alternatives would seasonally limit OHV travel within active heronries to protect nesting sites. Cross-country motorized OHV travel for lessees and permittees would be limited to accessing a leased or permitted site.

The impacts from these actions would be adverse to OHV users because seasonal restrictions would limit or reduce recreational opportunities during heron nesting. There would be no impacts from restricting lessee and permittee cross-country OHV use to site inspection on OHV recreational opportunities because the intent and purpose of the cross-country allowance would be site inspection, not recreation.

Impacts from Management Common to All Action Alternatives

Travel routes would be designated as either OHV limited or closed. It should be noted, as discussed above under Recreation Impacts on Recreation (Section 4.3.5.3.1), that for Hackberry Lake and Alkali Lake SRMAs, all OHV activity would be OHV limited; however, this designation would apply to the entire OHV play areas within the SRMAs so that OHV use would be effectively open and cross-country within the play areas.

Table 4-173. OHV Travel Designations and Acreages

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Limited to designated routes	–	–	–	–	–
Limited to existing routes	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966 (2.7)	52,028 (2.5)	41,936 (2.0)	38,738 (1.9)	38,737 (1.9)
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Impacts from the No Action Alternative

Under the current RMP, the impacts of OHV limited routes would continue to provide beneficial, long-term travel-related recreational opportunities for motorized OHV and mountain biking user groups, with no impacts on recreation resources, as these routes would not increase surface disturbance impacts to recreation resources.

Impacts from Alternative A

Management actions under Alternative A would designate 2,039,299 acres as OHV limited and 52,028 acres (2.5% of the planning area) as closed to OHV use.

There would be no impacts on scenic drivers and specialized recreation users as these user groups are not likely to have resource-use conflicts with OHV users; the impacts on river users and non-mechanized users would be beneficial in the long term if non-motorized or closed areas were designated along river corridors and in backcountry hiking and camping areas, otherwise noise-related impacts from motorized OHV use would have potentially adverse impacts on the recreational expectations of solitude, quiet, and remoteness for these groups. The potential impacts of this alternative's management actions on non-mechanized users would be a direct, long-term, adverse reduction in recreation opportunities for solitude and a sense of backcountry remoteness caused by noise-related OHV use if OHV limited routes were to lie near hiking and equestrian trails, primitive and undeveloped camping areas, and river segments where solitude, quiet, and a sense of remoteness are recreation expectations.

Compared to the No Action Alternative, this alternative would be more beneficial to mechanized users because there would be a 3,938-acre reduction in OHV closed areas, which would create a minor increase in opportunities for OHV recreational travel.

Impacts from Alternative B

Under this alternative 2,049,391 acres would be designated as limited OHV use, and 41,936 acres (2% of the planning area) designated as closed to OHV use. The impacts on recreational opportunities would be the same as discussed under Alternative A because the acres of designated limited and closed OHV areas would be similar. Fewer acres (14,030 acres) would be designated as closed, when compared to the No Action Alternative, so there would be a beneficial increase in opportunities for OHV users, but a reduction in beneficial impacts for non-mechanized user groups.

Impacts from Alternatives C and D

Under Alternatives C and D, management actions would designate 2,052,582 acres as OHV limited and 38,738 acres (1.9% of the planning area) as closed to OHV travel. The impacts to recreation would be the same as discussed under Alternative A because the designated acreages would be similar. There would be 17,229 fewer acres designated as closed, when compared to the No Action Alternative, so there would be a reduction in beneficial impacts for non-mechanized user groups, but a minor, beneficial increase for OHV users from increased travel opportunities.

4.3.5.3.22 Impacts of Vegetation Actions on Recreation

Impacts from Management Common to All

Common management actions for all of the alternatives would include protecting trees within migratory and threatened and endangered bird habitat, rangeland restoration would continue in order to maintain and improved habitat for wildlife, and vegetation treatments would include chemical, mechanical, and fire. The impacts to recreation resources from these actions would be both adverse and beneficial.

Short-term, directly adverse impacts would be cause by vegetation treatments that temporarily alter the visual landscape visually and temporarily alter existing wildlife habitat. As discussed in Fire Management, prescribed burning (and chemical and mechanical treatments) would temporarily degrade scenic quality, with adverse effects for all recreation user groups, until vegetation regrowth; short-term loss of wildlife habitat (until vegetation regrowth) would adversely affect wildlife viewers because opportunities for sightseeing would be reduced, and all recreation users would be adversely affected in the short-term by potential exclusion from treated areas until vegetation regrowth.

Long-term, beneficial impacts recreation resources and to all recreation users would be caused by protectively maintaining wildlife habitat and by treatment-improved wildlife habitat that would increase the opportunities for recreational wildlife viewing.

Impacts from Management Common to All Action Alternatives

There are no common management actions that are common to all of the action alternatives, and no specific actions that pertain to recreation other than those discussed above.

4.3.5.3.23 Impacts of Visual Resources Actions on Recreation

Impacts from Management Common to All

Management common to all of the alternatives would manage leased areas to accommodate transmission infrastructure (power lines, pipelines, access) along utility corridors to concentrate surface disturbances and preserve scenic quality. These actions would have no impacts on recreation resources. Also, management actions would designate VRM class objectives for all BLM-administered lands within the planning area. The designation of VRM Class I and II would have direct, long-term beneficial impacts on recreation resources and on all users of the resource because these classes would preserve landscape scenic quality. The designation of VRM Class III and IV would have potentially long-term, adverse impacts on the resource and resource users because these VRM classes would permit moderate to major surface disturbances on the landscape that would degrade scenic quality.

The proposed VRM class designations for the planning area are shown in Table 4-174.

Table 4-174. VRM Class Acreage for BLM-administered Lands within the Planning Area

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class I	7,058	37,764	42,102	7,171	7,171
Class II	43,613	235,946	315,700	60,791	41,092
Class III	402,725	367,205	294,177	549,329	546,205

VRM Class	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Class IV	2,330,462	2,142,600	2,131,501	2,166,266	2,189,116
Subtotal I and II	50,671 (1.8)	273,710 (9.8)	357,802 (12.8)	67,962 (2.4)	48,263 (1.7)
Subtotal III and IV	2,733,187 (98.2)	2,509,805 (90.2)	2,425,678 (87.2)	2,715,595 (97.6)	2,735,321 (98.3)
Total*	2,783,858	2,783,514	2,783,481	2,783,558	2,783,585

*The acreage totals are not consistent for all of the alternatives because of GIS shapefile mapping overlaps.

Impacts from Management Common to All Action Alternatives

There are no management actions common to all of the action alternatives.

Impacts from the No Action Alternative

Under the current RMP management actions, 50,671 acres would be managed as VRM Class I and II to preserve and protect scenic quality within the planning area, with the remaining 2,733,187 acres (98.18% of the planning area) managed under VRM Class III and IV for moderate to major landscape surface disturbances. The VRM Class I and II resource objectives would have long-term, protection-related, beneficial impacts on recreation resources and all recreation resource users because recreation-related scenic quality would be preserved; the areas managed under VRM Class III and Class IV objectives would have long-term, adverse impacts on recreation resources and all resource users from management for low scenic quality.

Impacts from Alternative A

Under Alternative A, 273,710 acres (9.8% of the planning area) would be managed as VRM Class I and Class II. Approximately 1,854,747 acres (90.2%) would be managed under the visual resource objectives of VRM Class III and Class IV. The VRM Classes I and II would have beneficial impacts on recreation resources and all users from preservation of scenic quality; VRM Classes III and IV would have adverse impacts on recreation resources and users from management for loss or maintenance of low scenic quality. Compared to the No Action Alternative, this alternative would manage 223,039 more acres under higher levels of VRM Class I and II scenic quality protection. This would have long-term beneficial impacts on recreation resources and users because more acres would be managed to prevent or mitigate surface disturbances to visual/scenic quality under VRM Class I and II, with associated long-term, beneficial impacts on recreation-related scenic quality. Compared to the No Action Alternative, this alternative would be more beneficial because more acres would be protected from potential scenic quality degradation.

Impacts from Alternative B

Management actions under Alternative B would designate 357,802 acres as VRM Class I and II, and the remaining 2,425,678 acres (87.15% of the planning area) would be designated as VRM Class III and IV, with the same impacts to recreation resources and users as discussed under Alternative A. This alternative would manage 307,131 more acres for protection under VRM Class I and II than the No Action Alternative, with more beneficial impacts to recreation because more acreage would be managed for the long-term protection and preservation of scenic quality. This alternative would have the most beneficial impacts of the action alternatives.

Impacts from Alternative C

Management actions under Alternative C would manage 67,962 acres for long-term beneficial scenic quality protection under VRM Class I and II, an increase of 17,291 acres when compared to the No Action Alternative. The remainder of the planning area (2,715,595 acres or 97.55%) would be managed under VRM Class III and IV objectives. The impacts on recreation resources and users are the same as discussed under Alternative A for the same reasons. This alternative would have more beneficial impacts on recreation-related scenic quality than the No Action Alternative because more acres within the planning area would be protected and preserved.

Impacts from Alternative D

Under Alternative D management actions would designate 48,263 acres within the planning area as VRM Class I and Class II; the remaining 2,735,321 acreage (98.27%) would be designated as VRM Class III and Class IV. The long-term impacts on recreation-related visual resources and users would be the same as discussed under Alternative A for the same reasons. Compared to the No Action Alternative, this alternative would adversely designate 2,408 fewer acres for recreation-related scenic quality protection and maintenance under VRM Classes I and II than the No Action Alternative. This alternative would be the least beneficial for recreation-related scenic quality preservation.

4.3.5.3.24 Impacts of Wildlife and Fish Actions on Recreation

Impacts from the No Action Alternative and Action Alternatives

Under the No Action and Action alternatives, the Birds of Prey grasslands and the Bluntnose Shiner habitat would be managed for protection of wildlife and fish species. The impacts of these actions on recreation resources and user groups are discussed above under 4.3.5.3.15 Impacts of Special Designations (ACECs) on Recreation.

4.3.6 Land Use Authorizations

Land use authorizations are administrative actions made in support of other programs rather than a program unto itself. The authorization process addresses requests from other programs for authorizations of such things as ROWs. ROWs are issued for such developments as pipelines, roads, communication facilities, and renewable energy facilities, among other types of developments.

4.3.6.1 Analysis Methods

4.3.6.1.1 Indicators

For the purpose of this analysis, the acres of land allocated by other program decisions to exclusion areas, avoidance areas, and withdrawals for land use authorizations, as well as lands allocated by other programs to designated ROW corridors are used as the indicator for comparing the impacts of the alternatives. In exclusion, avoidance, and withdrawal areas ROW authorizations would not be permitted. The acres in which land use authorizations would be restricted in some fashion are compared between alternatives where such data are applicable.

4.3.6.1.2 Methods and Assumptions

Methods

The degree to which land use authorizations can be issued is affected by management decisions from other programs and whether those programs allow or restrict such authorizations in support of that program's resource. As such, the analysis presented below simply calculates the total acreage of program decisions by alternative that would affect the issuance of land use authorizations.

Assumptions

This analysis assumes, that unless otherwise indicated, land use authorizations would be managed in accordance with standard BLM lands policies as related to the Mineral Leasing Act, FLPMA permits and ROWs, access, easements, transportation and utility corridors, trespass resolutions, etc. The analysis also assumes that the CFO's existing policy of reviewing all existing withdrawals on a regular basis would still occur under all alternatives, and adjustments to withdrawals may be made with due cause.

4.3.6.1.3 Direct and Indirect Impacts

Land use authorizations are not subject to direct impacts. Rather, they are subject to indirect impacts from other program management decisions. That is, if another program designates an area as a ROW avoidance area to protect a given land use or resource, a land use authorization for such a ROW cannot be granted. The issuance of ROW authorizations can be restricted in the short-term or the long-term depending on the duration of other program decisions that implement avoidance, withdrawal, and exclusion areas.

The decisions by most resource programs would have at most a negligible effect on land use authorizations because they do not determine whether land use authorizations would be issued. Those programs that *would* influence land use authorizations are discussed further in the analysis below and include the following:

- Cave and Karst Resources
- Land Use Authorizations
- Lands with Wilderness Characteristics
- Recreation
- Renewable Energy
- Riparian Resources
- Special Designations
- Special Status Species
- Visual Resource Management

Note that in some cases, only authorizations for ROWs would be affected by program decisions, while in others a broader array of land use authorizations beyond ROWs would be affected. The distinctions between these two situations are identified in the analysis that follows.

Those programs that *would not* influence land use authorizations are not discussed further and include the following:

- Air Quality
- Back Country Byways
- Cultural Resources
- Wildland Fire and Fuels Management
- Land Tenure
- Livestock Grazing
- Minerals and Leasing
- Noxious Weeds
- Riparian Resources
- Paleontological Resources
- Soils
- Travel Management
- Water Resources
- Wildlife and Fish

4.3.6.1.4 Impacts Common to All Alternatives

Certain program decisions affect the ability to issue land use authorizations in the CFO or influence how those authorizations are issued regardless of which alternative is considered. These decisions and their resulting affects to land use authorizations are summarized in Table 4-175.

Table 4-175. Effects of Management Common to All Alternatives on Land Use Authorizations

Resource Program	Impact to Land Use Authorizations
Land Use Authorizations	Issuances of land use authorizations would be subject to site-specific environmental review, and special conditions may be placed on authorizations in cases of environmental conflict. A total of approximately 479 miles (184,201 acres) of specific ROW corridors would be designated under all alternatives. Because of the need for temporary surface water lines and hydraulic fracturing ponds, hydraulic fracturing operations may require more temporary ROWs than conventional drilling operations.
Recreation	The Trails RMZ portion of the Dunes RMZ would be managed as a combination of excluded to ROWs (in dunes) and avoidance of ROWs (on trails). This designation would limit the ability to issue land use authorizations in this area.
Riparian	Approximately 7,278 acres of riparian areas would be identified as avoidance or exclusion areas for ROWs. This would limit the ability to issue land use authorizations in these areas.

Resource Program	Impact to Land Use Authorizations
Special Designations	Approximately 7,086 acres of WSAs would be managed as exclusion areas for future ROWs. This would limit the ability to issue land use authorizations in these areas.
Visual Resource Management	Areas designated VRM Class I would be managed as ROW exclusion areas. No ROW authorizations could be made in these areas. The actual acreage of VRM Class I management varies by alternative and is summarized in Table 4-176 below.
Minerals Allocations on Split Estate Lands	Surface development on split estate lands designated as open to leasable, salable, and locatable minerals development under varying levels of terms and conditions would be subject approval by the surface estate owner and could limit the nature of land use authorizations issued by the BLM in those areas.

4.3.6.1.5 Impacts Common to All Action Alternatives

A small number of program management decisions specific to only the action alternatives affect whether the CFO would issue land use authorizations for ROWs or communications sites or otherwise influence conditions that would be applied to any such authorizations. These decisions and their interaction with land use authorizations are summarized in Table 4-176.

Table 4-176. Effects of Management Common to All Action Alternatives on Land Use Authorizations

Resource Program	Impact to Land Use Authorizations
Cave and Karst Resources	See Special Designations.
Land Use Authorizations	All lands in the planning area except those specifically designated as exclusion, avoidance, or withdrawal areas would be open to consideration for land use authorizations, including ROWs, pending site-specific and project-specific analysis. This would provide flexibility to the land use program in issuing land use authorizations.
Lands with Wilderness Characteristics	All lands managed to maintain or protect wilderness characteristics would be designated as ROW exclusion areas, thereby limiting the issuance of land use authorizations in these areas. The actual acreage of designated lands with wilderness characteristics varies by alternative and is summarized in Table 4-177 below.
Recreation	The Black River SRMA (1,275 acres) would be managed as a ROW exclusion area. The Hackberry Lake SRMA (38,942 acres) would be managed as an avoidance area for ROWs. These decisions would limit the ability to issue land use authorizations in these two SRMAs.
Special Designations	Blue Springs Riparian Habitat ACEC (160 acres) and Bluntnose Shiner Habitat ACEC (201 acres) would be managed as avoidance areas for future ROWs, while the Lonesome Ridge ACEC (3,021 acres), the Laguna Plata ACEC (4,496 acres), the Cave Resources ACEC (18,832 acres), the Maroon Cliffs ACEC (8,659 acres), the Pope's Well ACEC (81 acres), and the Serpentine Bends ACEC (4,216 acres) would be managed to exclude future ROWs. Additionally, the Black River WSR would be managed as an exclusion area for ROWs and the Delaware River WSR would be managed as either an avoidance or exclusion area for ROWs depending on the action alternative in question. These decisions would limit the ability of the BLM to issue land use authorizations in these areas.

4.3.6.1.6 Impacts of Program Decisions on Land Use Authorizations

Impacts from Program Decisions by Alternative

As noted above, the ability of the CFO to issue land use authorizations (i.e., ROWs) for actions in the planning area are affected by decisions in other management programs. Programs that impose exclusion areas, avoidance areas, or withdrawals for ROWs or communications sites to accomplish program goals and objectives prohibit the issuance of land use authorizations for the affected area(s). Table 4-177

provides a summary of the different management programs for which ROW or communication site restrictions would be placed under different alternatives and offers a comparison by alternative of the total acres for which such authorizations would be prohibited. Note that there may be some overlap between the program decisions summarized below. That is, ROW restrictions under one program may occur on the same lands where similar restrictions would be instituted under another program. However, the acreages provided in Table 4-177 offer a relative comparison of alternatives.

Table 4-177. Acres of Right-of-way Exclusions, Avoidance, and Withdrawal for Each Alternative

Program	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Lands with Wilderness Characteristics managed to protect wilderness characteristics	2,904 (avoid)	66,661 (exclude)	47,607 (exclude)	5,118 (exclude)	1,220 (exclude)
Recreation (SRMAs and ERMAs)	6,546 (avoid), 148 (exclude)	39,851 (avoid), 11,582 (exclude)	47,805 (avoid), 23,118 (exclude)	47,797 (avoid), 17,622 (exclude)	36,883 (avoid), 12,690 (exclude)
Renewable Energy – Solar (exclude)	1,778,338	767,685	832,368	734,276	629,955
Renewable Energy – Wind	947,940 (avoid) 7,061 (exclude)	623,320 (avoid), 666,783 (exclude)	417,997 (avoid), 912,251 (exclude)	881,634 (avoid), 206,184 (exclude)	925,282 (avoid), 73,142 (exclude)
Renewable Energy – Geothermal (close)	0	0	0	35	0
Special Designations – ACECs	5,533 (avoid), 1,158 (exclude)	411,275 (exclude)	2,178 (avoid), 481,248 (exclude)	19,355 (avoid), 41,810 (exclude)	2,979 (avoid), 24,246 (exclude)
Special Status Species	15,664 (avoid), 2,985 (exclude)	1,008,999 (avoid), 407,939 (exclude)	365,722 (avoid), 1,051,207 (exclude)	195,419 (avoid), 165.911 (exclude)	313,825 (avoid), 20,010 (exclude)
Visual Resources	7,058	37,764	42,102	7,171	7,171

As Table 4-177 above illustrates, Alternative D would have by far the least total amount of land designated for ROW exclusion, avoidance, or withdrawal. As such, the Alternative D would have the fewest restrictions (i.e., least impact) on the issuance of land use authorizations. By contrast, Alternative B would have the most acreage designated as ROW exclusion, avoidance, or withdrawal, thereby having the greatest impact on the ability to issue land use authorizations. Alternatives A and C would be the next most restrictive. Alternative C would be somewhat less restrictive than Alternatives A and B but far more restrictive than the Alternative D and the No Action Alternative in terms of the ability to issue land use authorizations.

4.3.7 Land Tenure

The land tenure program is a support program for other resource programs as well as general BLM land management objectives and responsibilities. The program responds to requests for land tenure adjustments from other programs or outside entities and initiates proactive land tenure adjustments to facilitate specific BLM resource management objectives. Broadly, the land tenure program is affected by decisions to retain, acquire, or dispose of land for management purposes. In some cases, land tenure decisions are influenced by regulatory requirements, such as those set forth in the Recreation and Public

Purposes Act (R&PP) (68 Statute 173; 43 USC 869 et. seq.). As discussed in Chapter 3, land tenure adjustments are made through either sale, purchases, donations to the BLM, acts of Congress and other federal legislation, and exchange.

4.3.7.1 Analysis Methods

4.3.7.1.1 Indicators

For the purpose of this analysis, the acres of land allocated to retention, disposal, withdrawal to other agencies, acquisition, and other land tenure adjustments are used as the indicator for comparing alternatives.

4.3.7.1.2 Methods and Assumptions

Methods

The analysis below uses calculations of acres identified by the CFO for land tenure adjustments in the planning area, including areas specifically identified for retention by resource programs. Land tenure adjustments that have occurred prior to this analysis are not included in the calculations; only future adjustments identified under one or more of the alternatives, including the No Action Alternative, are evaluated.

Assumptions

This analysis assumes that unless otherwise indicated, land tenure adjustments would be made in accordance with standard BLM lands policies as related to the R&PP, FLPMA, withdrawals, disposals, acquisitions, etc. The analysis also assumes that existing withdrawals to other federal agencies would continue and would not be returned to the BLM and that resource programs (e.g., cultural resources, wildlife, and recreation) establish the priority or the urgency associated with any acquisition of lands.

4.3.7.1.3 Direct and Indirect Impacts

Land tenure is not subject to direct impacts per se. Rather it is subject to indirect impacts from other program management decisions or requests from outside parties. That is, if another program identifies an area for retention or acquisition, a land tenure adjustment would be initiated. Similarly, if an outside party applies for an exchange, withdrawal, or other acquisition of land, a land tenure adjustment would be considered.

Most resource programs do not specifically identify land tenure adjustments under any of the alternatives and would, therefore, have no effect on the land tenure program. Those programs that *would* influence land use authorizations are discussed further in the analysis below and include the following:

- Cultural Resources
- Land Tenure
- Lands with Wilderness Characteristics
- Paleontological Resources
- Recreation
- Special Designations

Those programs that *would not* influence land tenure adjustments are not discussed further and include the following:

- Air Quality
- Back Country Byways
- Cave and Karst Resources
- Wildland Fire and Fuels Management
- Land Use Authorizations
- Livestock Grazing
- Minerals and Leasing
- Noxious Weeds
- Paleontological Resources
- Renewable Energy
- Riparian Resources
- Soils
- Special Status Species
- Travel Management
- Visual Resource Management
- Water Resources
- Wildlife and Fish

4.3.7.1.4 Impacts Common to All Alternatives

Certain program decisions would direct or influence the same land tenure adjustments in the CFO planning area regardless of which alternative is considered. These decisions and their resulting affects to land tenure adjustments are summarized in Table 4-178.

Table 4-178. Effects of Management Common to All Alternatives on Land Tenure

Resource Program	Impact to Land Tenure
Cultural Resources	Inventories or assessments for cultural resources would be required prior to approval of land disposals. Areas of cultural resource concern would not be prioritized for disposal. Protection of cultural resources would be prioritized in considerations of land acquisition and land exchange. This would limit the ability to enact land exchanges, particularly in areas of high cultural resource sensitivity.
Land Tenure	Public lands not specifically identified for disposal would be retained in BLM ownership and managed for multiple use. All lands considered for disposal would meet criteria in Sections 203, 206, or 209 of FLPMA. This means that the vast majority of land in the planning area would be identified for retention pending future requests from outside parties. BLM-administered lands within the Carlsbad Caverns National Park would be made available for exchange to accommodate the NPS objective to acquire a private inholding within the National Park amidst lands administered by the NPS; parties involved in the exchange would include the BLM, the NPS, and the private inholder. This decision would authorize consideration of a land tenure adjustment. Land disposal would avoid springs and seeps by 328 feet unless the water source has been closed. The BLM would prioritize lands for sale, exchange, or title transfer based on whether said lands are needed for a federal project or resource management activity; are important to the national interest; or are not cost efficient for the BLM to manage. Existing R&PP authorizations would be terminated and converted to other land tenure adjustment methods (e.g., sale) if the criteria for disposal are met.
Paleontological Resources	Inventories or assessments for paleontological resources would be required prior to approval of land disposals. Areas of paleontological resource concern would not be prioritized for disposal. Protection of paleontological resources would be prioritized in considerations of land acquisition and land exchange. This would limit the ability to enact land exchanges, particularly in areas of high paleontological resource sensitivity.
Special Designations	All WSAs (7,086 acres) would be specifically retained in federal ownership, making these lands unavailable for disposal or exchange.

4.3.7.1.5 Impacts Common to All Action Alternatives

A small number of program management decisions specific to only the action alternatives affect whether the CFO would authorize land tenure adjustments. These decisions and their interaction with land use authorizations are summarized in Table 4-179.

Table 4-179. Effects of Management Common to All Action Alternatives on Land Tenure

Resource Program	Impact to Land Tenure
Land Tenure	All springs and seeps would be closed or withdrawn from mineral disposal and locatable minerals use allocations. Land tenure adjustments would not be made for disposal of these lands for the purposes of mineral resource uses. If the Federal Land Transaction Facilitation Act is reauthorized, lands available for disposal would have to meet the Federal Land Transaction Facilitation Act criteria for disposal. Acquisition priorities (not in priority order) would include: • Endangered, threatened, proposed, or candidate species habitat; • BLM Type 2 sensitive species habitat; • lands within special designations; • riparian areas; • lands containing known archaeological, paleontological, or historical values determined to be unique or of traditional or scientific importance; • lands that would provide public access to public lands, including but not limited to river access and areas of high recreation value; • lands that would help consolidate public land; and • lands that would help improve livestock grazing management. Variances for disposal of land in areas identified for retention could be authorized to facilitate state exchanges if doing so would consolidate blocks of public land, consistent with multiple use objectives, and there is a compelling need.
Lands with Wilderness Characteristics	All lands with wilderness characteristics would be specifically designated for retention in federal ownership. The actual acreage of designated lands with wilderness characteristics varies by alternative and is summarized in Table 4-180 below.

4.3.7.1.6 Impacts of Program Decisions on Land Tenure

Impacts from Program Decisions by Alternative

As noted above, land tenure adjustments are affected by decisions in other resource programs or by requests from outside parties. Programs that specifically identify lands for disposal or retention establish priorities for land tenure adjustments. The amount of land identified for retention or disposal by the resource programs varies by alternative, save for those areas listed in the sections above that would be designated across all alternatives or all action alternatives. Table 4-180 provides a summary of acres identified for retention and disposal under the different alternatives. Map 3-32 displays the No Action Alternative disposal areas and Maps 2.63 through 2.66 display the proposed disposals for Alternatives A through D, respectively. All remaining lands administered by the CFO would be identified for retention pending future requests for land tenure adjustments.

Table 4-180. Acres of Land Tenure Adjustments by Alternative

Action	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Disposal	218,318	18,703	26,125	31,536	51,579
Retention	1,872,747	2,070,580	2,063,155	2,057,744	2,037,362

As Table 4-180 above illustrates, the No Action Alternative would designate more than four times as much land to disposal than any other alternative. It would also designate less land to retention than any alternative. Alternative A would designate the least land to disposal and the most to retention. Alternatives B, C, and D would be roughly comparable to each other in terms of land tenure adjustments, but of these three alternatives, Alternative D would designate the most land to disposal, and Alternative B would designate the most land for retention.

4.4 SPECIAL DESIGNATIONS

There are four types of special designations relevant to the impacts analysis in this chapter: ACECs, WSAs, WSRs, and the Dark Canyon and Guadalupe Backcountry Byways (Table 4-181).

Table 4-181. Special Designations in the Planning Area

Special Designations	No Action Alternative*	Alternative A	Alternative B	Alternative C	Alternative D
ACECs	6 ACECs 13,435 acres	9 ACECs 495,042 acres	15 ACECs 561,441 acres	8 ACECs 98,563 acres	5 ACECs 28,894 acres
WSAs	4 WSAs 7,086 acres	4 WSAs 7,086 acres	4 WSAs 7,086 acres	4 WSAs 7,086 acres	4 WSAs 7,086 acres
WSRs	None	2 WSR segments suitable	1 WSR segment suitable	1 WSR segment suitable	1 WSR segment suitable
Backcountry byways	Dark Canyon and Guadalupe	Guadalupe	Guadalupe	Dark Canyon and Guadalupe	Dark Canyon and Guadalupe

* The No Action Alternative includes other existing special designations, including RNAs, ONAs, and SMAs. Information on existing special designations is found in Section 3.4, Special Designations, of this RMP/EIS.

As described in the footnote above, current specially designated areas would be retained under the No Action Alternative. Under the action alternatives (Alternatives A through D), some of the existing ACECs would be retained. However, most of these special designations (including all RNAs, ONAs, and SMAs are replaced and redesignated as ACECs and the action alternatives replace the existing management activities in these areas with other management activities, as identified in the analysis below.

Management of specially designated areas focuses on allowing uses or activities that are compatible with the specific special resources of concern, while restricting any uses or activities that would impact those identified value(s). In the case of ACECs, under FLPMA, the BLM is required to manage an ACEC to protect its specific identified relevant and important values. For WSAs, the FLPMA requires the BLM to maintain wilderness characteristics. For river segments that are eligible for congressional designation into the NWSRS, the Wild and Scenic Rivers Act focuses management on protecting the specific, identified, outstandingly remarkable values, free-flowing nature, and tentative classifications for eligible river segments. For Backcountry Byways, BLM Handbook, 8357-1 mandates the BLM to focus management on providing opportunities for scenic driving and educational interpretation of unique features found along a designated road. This impact analysis will determine how each alternative impacts the relevant and important values for ACECs, the wilderness characteristics in WSAs, the outstandingly remarkable values for WSRs, and scenic driving and educational interpretation opportunities for Backcountry Byways.

4.4.1 Areas of Critical Environmental Concern

ACECs are areas where special management attention is needed to protect and prevent irreparable damage to important historical, cultural, and scenic values, fish, or wildlife resources, or other natural systems or processes, or to protect human life and safety from natural hazards (BLM Manual 1613 – Areas of Critical Environmental Concern). To qualify as an ACEC, an area must meet one or more of the following criteria (43 CFR 1610.7-2 and BLM Manual 1613 – Areas of Critical Environmental Concern):

- A significant historical, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).
- A fish and wildlife resource (including but not limited to habitat for endangered, threatened, or sensitive species, habitat for pollinators, or habitat essential for maintaining species diversity).
- A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities that are terrestrial, aquatic, or riparian; or rare geological features).
- Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the RMP process that it has become part of a natural process.

4.4.1.1 Analysis Methods

4.4.1.1.1 Indicators

In this analysis, potential impacts to proposed ACECs are assessed quantitatively using acres of land where potential development or management actions would degrade or improve the relevant and important values for which the proposed ACEC is managed. For example, if an ACEC is designated to protect fragile soils and threatened and endangered species, then any acres of development or management actions within this ACEC that disturb fragile soils or affect habitat for threatened and endangered species would be degraded.

4.4.1.1.2 Methods and Assumptions

For an area to be designated as an ACEC, it must meet the criteria of "relevance" and "importance" and require special management to protect the relevant and important values as described in 43 CFR 1610.7-2 and BLM Manual 1613. This analysis focuses on impacts to these values. These impacts are described in detail under the No Action Alternative. The subsequent impacts analysis for the action alternatives (A, B, C, and D) discloses their level of impact in comparison to the No Action Alternative.

ACECs are areas that are subject to special management to protect relevant and important values. While standard management includes compliance with policy, laws, and mandates, special management typically includes restrictive prescriptions such as closures to mineral development, closures or limits on OHV use, and stipulations to protect resource values.

Adverse effects to the relevant and important values for each ACEC under all action alternatives primarily occur as a result of surface disturbance. To assess effects to the relevant and important values for each ACEC, the analysis assumes that any areas open to activities that cause surface disturbance within an ACEC, that surface disturbance would occur in that area sometime during the life of the RMP. The analysis also assumes that the more surface disturbance that occurs within an ACEC, the more the relevant and important values are adversely affected under a particular alternative.

4.4.1.2 Proposed Areas of Critical Environmental Concern

Under the action alternatives, the BLM proposes new ACECs and continued management of some existing ACECs. Table 4-182 summarizes the proposed ACECs by alternative. This section only discusses the proposed new ACECs and their resources and values. Any ACECs unchanged from the 1988 RMP are described in Chapter 3. Table 4-183 identifies the acres and percentage of the proposed ACEC that encompass the 1988 special designations. This table helps identify which special designations would continue to apply to the area under the No Action Alternative.

Table 4-182. Existing and Proposed Areas of Critical Environmental Concern by Alternative (acres)

ACEC	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Birds of Prey	–	349,355	349,355	–	–
Blue Springs Riparian	444	–	–	–	–
Boot Hill	–	–	1,065	–	–
Carlsbad Chihuahuan Desert Rivers	–	108,474	–	–	–
Cave Resources	*	19,625	19,625	19,625	19,625
Chosa Draw	2,797	–	–	–	–
Dark Canyon	1,525	–	–	–	–
Desert Heronries	–	–	48,708	–	–
Gypsum Soils	–	–	65,562	65,554	–

ACEC	No Action	Alternative A	Alternative B	Alternative C	Alternative D
Laguna Plata	*	4,496	4,496	–	–
Lonesome Ridge	2,981	3,021	3,021	3,021	3,021
Maroon Cliffs	*	–	8,659	–	–
Pecos Bluntnose Shiner	*	201	201	201	201
Pecos River Canyons Complex	5,688	4,115	4,115	4,115	–
Pope's Well	81	–	81	81	–
Salt Playas	–	–	49,772	–	–
Seven Rivers Hills	*	–	1,027	1,027	1,027
Serpentine Bends	–	5,019	5,019	5,019	5,019
Six Shooter Canyon	–	735	735	–	–

"–" denotes no ACEC designated under that alternative.
* Under the No Action Alternatives, these areas are not managed as ACECs but through other existing special designations (RNAs, ONAs, SMAs, or WSAs). See Chapter 3, Section 3.4, for more information these other designations.

Table 4-183. Existing Special Designations within Proposed Areas of Critical Environmental Concern

Proposed ACEC	BLM Surface Ownership Acreage of Proposed ACEC	Acres of 1988 RMP Special Designations within Proposed ACEC	Percentage of Proposed ACEC with 1988 RMP Special Designations
Birds of Prey	349,355	No special designations	–
Boot Hill	1,065	387 acres Paco Site SMA	36.3%
Carlsbad Chihuahuan Desert Rivers	108,483	2,835 acres Chosa Draw ACEC 553 acres Yeso Hills RNA 2,835 acres Cave Resources SMA 23,760 acres Guadalupe Escarpment Scenic Area 2,470 acres Pecos River Corridor SMA 290 acres Springs Riparian HMA	2.6% 0.5% 2.6% 22.0% 2.7% 0.3%
Cave Resources	19,625	2,835 acres Chosa Draw ACEC 629 acres Dark Canyon ACEC 493 acres Dry Cave RNA 8,141 acres Cave Resources SMA 7,156 acres Guadalupe Escarpment Scenic Area	14.4% 3.2% 2.5% 41.4% 36.4%
Desert Heronries	48,711	80 acres Pope's Well SMA 760 acres Maroon Cliffs CRMA 27,254 Phantom Banks Heronries SMA	0.16% 1.56% 56.0%
Gypsum Soils	65,564	2,835 acres Chosa Draw ACEC 553 acres Yeso Hills RNA 2,835 acres Cave Resources SMA 20,524 acres Guadalupe Escarpment Scenic Area 2,466 acres Pecos River Corridor SMA 290 acres Springs Riparian HMA	4.3% 0.8% 4.3% 31.3% 3.7% 0.4%
Laguna Plata	4,496	4,455 acres Laguna Plata SMA	99.0%
Lonesome Ridge	3,021	2,981 acres Lonesome Ridge ACEC, ONA, and SMA 86 acres Guadalupe Escarpment Scenic Area	98.6% 2.8%

Proposed ACEC	BLM Surface Ownership Acreage of Proposed ACEC	Acres of 1988 RMP Special Designations within Proposed ACEC	Percentage of Proposed ACEC with 1988 RMP Special Designations
Maroon Cliffs	8,659	8,727 acres Maroon Cliffs CRMA	100.0%
Pecos Bluntnose Shiner	201	201 acres Bluntnose Shiner HMA	100.0%
Pecos River Canyons Complex	5,688	4,101 acres Pecos River Canyons Complex ACEC 641 acres Pecos River Canyons Complex RNA 1,780 acres Bear Grass Draw SMA	99.7% 15.6% 43.0%
Pope's Well	81	81 acres Pope's Well SMA	100%
Salt Playas	49,772	4,455 acres Laguna Plata SMA	9.0%
Serpentine Bends	5,019	708 acres Dark Canyon ACEC 49 acres Cave Resources SMA 3,502 acres Dark Canyon Scenic Area	14.1% 0.97% 70.0%
Seven Rivers Hills	1,027	522 acres Seven Rivers Hills SMA	51.0%
Six Shooter Canyon	735	No special designations	–

Note: HMA = Habitat Management Area.

4.4.1.2.1 Direct and Indirect Impacts

Impacts of Actions on Areas of Critical Environmental Concern

With the No Action Alternative six currently designated ACECs would be designated and continue to be managed as ACECs, and their relevant and important values, including historic, cultural, scenic, and fish and wildlife resources, would continue to be protected, subject to valid existing rights. Alternative A would designate nine areas as ACECs, Alternative B would designate 15 areas as ACECs, Alternative C would designate eight areas as ACECs, and Alternative D would designate five areas as ACECs. See Table 4-183 above for acreages under the No Action Alternative and each action alternative.

Surface disturbance would increase soil erosion, which can negatively impact cultural and paleontological resource sites and increase sedimentation in streams. Increased sedimentation in streams would modify riparian habitat for fish and wildlife, and degrade karst resources. Surface disturbance can also modify vegetation, which changes habitat for sensitive, threatened, or endangered fish and wildlife. Vegetation modification can also change scenery values and reduce scenic quality. Finally, surface disturbance caused by the installation of oil and gas, renewable energy, or transmission line infrastructure would modify the scenic quality by introducing human objects into the natural environment.

For mineral and renewable energy development, the more acres where mineral and renewable energy development is open within existing and potential ACECs, the fewer acres within the ACEC that retain relevant and important values. In areas where mineral or renewable energy development would be allowed, the likelihood of surface disturbance affecting relevant and important values would be greater in areas where mineral or renewable leasing is open than in areas where leasing is open with moderate or major constraints. Areas that are closed to mineral or renewable leasing or withdrawn from leasing would have little or no adverse effect to the relevant and important values within an ACEC.

Areas that are designated as OHV limited travel, either to existing or designated routes, would provide some protection to relevant and important values by minimizing surface disturbance, but adverse effects to relevant and important values may occur within existing or designated routes. Areas closed to OHV use would have no adverse effect to relevant and important values. Areas open to grazing within an ACEC under various action alternatives would increase the likelihood of adverse effects through trampling of any relevant and important values that are sensitive to soil compaction and erosion, such as cultural resource sites.

With the proposed RMP and all alternatives, relevant and important values of existing and potential ACECs would benefit from the special management attention they would receive if designated, including development of comprehensive, integrated activity plans in some cases. The plans would address the maintenance and development of OHV or non-motorized trails to avoid areas where relevant and important values occur. Activity plans would also identify facilities necessary to maintaining relevant and important values, and siting of other surface-disturbing activities that would be complementary to the relevant and important values of each ACEC.

In the proposed RMP and alternatives where some potential ACECs would not be designated or where surface disturbance would occur, the relevance and importance of these areas may be at some risk of irreparable damage during the life of the RMP, depending on the specific resource use or other actions proposed by the proposed RMP or alternative.

Decisions that would generally have a positive impact on existing and potential ACECs, regardless of whether the proposed RMP or other alternative is chosen, include those involving fire, soil and watershed, and vegetation (including riparian and upland vegetation) management. Vegetation treatments would restore vegetative communities to resemble more natural ecosystems in the long term, which are important to protecting the identified relevant and important values in some of the ACECs.

Birds of Prey Grasslands

The Birds of Prey Grasslands area contains important avian wildlife resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives A and B, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative, Alternative C, and Alternative D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Birds of Prey Grasslands area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

Under the No Action Alternative, the Birds of Prey Grasslands area (349,355 acres) would not be managed as an ACEC, but would instead be managed according to the following management prescriptions. Mineral leasing decisions for the Birds of Prey Grasslands ACEC are summarized in Table 4-184. Approximately 298,778 acres would be excluded from solar energy development and the remainder open. For wind energy development, 166,059 acres would be open and 174,446 acres would be an avoidance area. Under the No Action Alternative, 201,443 acres under leasables would be open with standard terms and conditions; 349,354 open under salables and locatable minerals would be open on all lands, also with standard terms and conditions. OHV-limited travel as well as livestock grazing would be open on 340,511 acres (97%) under this alternative. According to draft guidelines for raptor conservation in the western United States, surface disturbance from mineral development, renewable energy development, OHV use, and grazing can result in the following effects to avian resources (USFWS 2008):

- physical destruction of important raptor habitat components;
- displacement of raptors from high-valued habitat and use of areas during crucial time periods (i.e., nesting, roosting);
- direct human caused stress, physical impairment, or mortality; and
- exposure to contamination.

Because the No Action Alternative would maintain existing surface-disturbing activities from mineral development and livestock grazing, there is little additional protection to raptor habitat besides the spatial buffers for raptors and the general prescriptions for the Aplomado Falcon which is common to all alternatives, causing an increased potential for the aforementioned effects. Therefore, the No Action Alternative would have the greatest impact on the relevant and important values for the area.

Alternatives A and B

Under Alternatives A and B, approximately 349,355 acres would be designated as the Birds of Prey Grasslands ACEC to protect avian wildlife resources. Mineral leasing decisions for the Birds of Prey Grasslands ACEC are summarized in Table 4-184.

Under both alternatives approximately 348,000 acres would be closed to geothermal development. Both wind and solar development would be excluded from approximately 340,000 acres within this ACEC. (see Table 4-185). All travel would be OHV-limited for both alternatives. Approximately 340,500 acres would be closed to livestock grazing under Alternative A, while only 1,450 acres would be closed to grazing under Alternative B.

Reduced potential for surface disturbance under these alternatives would reduce the potential for adverse effects compared to the No Action Alternative, including physical destruction of important raptor habitat components; displacement of raptors from high-valued habitat and use of areas during crucial time periods (i.e., nesting, roosting); direct human caused stress, physical impairment, or mortality; and exposure to contamination. These management actions would preserve raptor and prey habitat, with indirect positive benefits to other wildlife that use those habitats. Therefore, both alternatives would preserve and protect the relevant and important raptor and avian wildlife values of the area.

Alternative C

Under Alternative C, the Birds of Prey Grasslands area (349,253 proposed acres) would not be managed as an ACEC, but would instead be managed according to the following management prescriptions. Table 4-184 provides mineral leasing options for this alternative by acres of land within the ACEC. Under this alternative, pipelines, transmission lines, and other linear infrastructure would utilize existing corridors, where possible. The BLM would identify corridors through the area for routing infrastructure. Approximately 226,231 acres of the area would be open for geothermal energy development, while 96% would be excluded from solar energy development. The same approximate area percentage (96%) would be classified as an avoidance area to wind energy development (see Table 4-185).

OHV travel would be OHV limited on 97% of the area, and fire suppression, and geophysical exploration would be OHV limited. Livestock grazing would be open for most of the area (97%) under Alternative C. Compared to the No Action Alternative, these management actions would help to preserve raptor habitat, with indirect positive benefits to wildlife that use that type of habitat. The actions would also reduce the potential for stress, impairment, and mortality and reduce exposure to contaminants from resource development. These stipulations and conditions would maintain habitat for important raptor prey species and preserve the relevant and important wildlife values in the area.

Alternative D

Under Alternative D, the Birds of Prey Grasslands area (349,282 acres) would not be managed as an ACEC, but would instead be managed according to the following management prescriptions. Mineral leasing decisions for the Birds of Prey Grasslands ACEC are summarized in Table 4-184. Under Alternative D, leasable mineral would be open with moderate constraints on 27.3% of the area. Approximately 254,500 acres would be open to salable minerals and 349,282 acres would be open to locatable minerals, both under standard terms and conditions. Solar (96%) and wind (96%) renewable energy development would be closed or avoided for most of the area. Travel for the majority of the area (97%) would be classified as OHV limited, and fire suppression, and geophysical exploration would be limited to existing trails/ Livestock grazing would be open in most of the area.

As discussed above, surface disturbance from resource development can result in destruction of habitat; displacement of raptors from habitat during crucial time periods; human-caused stress, physical impairment, or mortality; and exposure to contamination (USFWS 2008). Although this alternative provides increased protection compared to the No Action Alternative, Alternative D has little protection for raptor habitat from surface-disturbing activities caused by mineral development and livestock grazing, causing an increased potential for the aforementioned effects. Therefore, the alternative would reduce protections for the relevant and important values within the area.

Table 4-184. Mineral Leasing Options for the Birds of Prey Grasslands Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***349,355***	***349,355***	***349,355***	***349,253***	***349,282***
Leasable: open with standard terms and conditions	201,443 (58%)	0	0	226,302 (65%)	254,777 (73%)
Leasable: open with moderate constraints (CSU)	138,311 (40%)	91 (<1%)	0	122,951 (35%)	94,504 (27%)
Leasable: open with major constraints (NSO)	0	0	0	0	0
Leasable: closed	9,600 (3%)	349,264 (100%)	349,355 (100%)	0	0
Salable: open with standard terms and conditions	349,354 (100%)	94 (<1%)	0	225,965 (65%)	254,536 (73%)
Salable: open with special terms and conditions (CSU)	0	226,119 (65%)	196,357 (56%)	123,024 (35%)	94,472 (27%)
Salable: avoid	0	0	0	0	0
Salable: closed	0	123,142 (35%)	152,997 (44%)	200 (<1%)	200 (<1%)
Locatable: open with standard terms and conditions	349,354 (100%)	320,594 (92%)	339,547 (97%)	349,253 (100%)	349,282 (100%)
Locatable: recommended for withdrawal	0	28,613 (8%)	9,661 (3%)	0	0

Table 4-185. Renewable Energy Leasing within the Birds of Prey Grasslands Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***349,355***	***349,355***	***349,355***	***349,253***	***340,413***
Geothermal: open	50,578 (14%)	437 (<1%)	596 (<1%)	226,231 (65%)	254,764 (75%)
Geothermal: close	298,778 (86%)	348,918 (99%)	348,755 (99%)	122,998 (35%)	94,502 (25%)
Solar: variance	41,782 (12%)	0	0	4,486 (1%)	4,484 (1%)
Solar: exclude	298,778 (86%)	340,511 (98%)	340,511 (98%)	335,927 (96%)	335,932 (99%)
Wind: open	166,059 (48%)	596 (<1%)	596 (<1%)	596 (<1%)	4,477 (1%)
Wind: avoid	174,446 (50%)	0	0	339,808 (97%)	335,928 (99%)
Wind: exclude	0	339,915 (97%)	339,915 (97%)	0	0

Boot Hill District

The Boot Hill District area contains important cultural and paleontological resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternative B this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives A, C, and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Boot Hill District area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative actions would not designate the Boot Hill District as an ACEC and would not afford the area special management protection. However, under the No Action Alternative, other resource decisions would continue to protect relevance and important cultural and paleontological values. Cultural and paleontological resources are adversely affected by surface disturbance, where removal of soil and rock can permanently alter or negatively impact the key features or attributes of a cultural or paleontological artifact.

Under the No Action Alternative, 679 acres (64%) would be open with moderate constraints to leasable minerals with standard terms and conditions, and the remainder (387 acres, or 36%) of the area would be open with major constraints. Salable and locatable minerals would be open with standard terms and conditions across the entire 1,065 acres. Renewable wind development would be open on 679 acres (64%) and would be avoided on the remainder (387 acres, or 36%) of the area. Solar energy development would be excluded under the No Action Alternative. Travel would be OHV limited, while fire suppression and geophysical exploration would be restricted to existing routes. Livestock grazing would be open across all 1,065 acres. While this alternative would provide the least amount of protection to cultural and paleontological resources in the area, the stipulations that restrict surface disturbance until a representative area were excavated would reduce the potential for destruction of important cultural and paleontological artifacts and would help preserve the relevant and important cultural and paleontological values in the area.

Alternatives A, C, and D

Alternatives A, C, and D would not designate the Boot Hill District as an ACEC, but special protections would still be in place to preserve relevant and important values. All three alternatives would be only open to leasable minerals development with major constraints for the entire area. Salable mineral development would be closed and locatable mineral development withdrawn from the area. Wind, solar, and geothermal energy would be excluded or closed from the area. OHV use, fire suppression, and geophysical exploration would be restricted to existing routes, and livestock grazing would be open. Compared to the No Action Alternative, restrictions on mineral development, renewable energy development and OHV travel would be greater under Alternatives A, C, and D. The restrictions on development and stipulations on surface-disturbing activities would still provide protection to cultural and paleontological resources in the area and would preserve the relevant and important cultural and paleontological values in the area.

Alternative B

Under Alternative B, the BLM would designate 1,065 acres as the Boot Hill District ACEC. The area would be managed to protect cultural and paleontological resources. The ACEC would be closed to leasable minerals development. Salable mineral development would be closed and locatable mineral development withdrawn from the area. Wind, solar, and geothermal energy would be excluded or closed from the area. OHV use, fire suppression, and geophysical exploration would be restricted to existing routes, and livestock grazing would be open. Compared to the No Action Alternative, the management actions under Alternative B would provide the greatest protections for cultural and paleontological resources. This alternative would protect and preserve relevant and important cultural and paleontological values.

Carlsbad Chihuahuan Desert Rivers

The Carlsbad Chihuahuan Desert Rivers area contains important historic, cultural, scenic, fish and wildlife, karst, paleontological, riparian, soils, and special status plant resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternative A, this area would be designated and managed as an ACEC to protect these values. However, Alternatives B and C would designate portions of the area as the Gypsum Soils ACEC instead. Under the No Action Alternative and Alternative D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Carlsbad Chihuahuan Desert Rivers area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative actions would not designate the Carlsbad Chihuahuan Desert Rivers as an ACEC and would not afford special management protection as the Carlsbad Chihuahuan Desert Rivers ACEC. However, existing special designations provided by the Chosa Draw ACEC, Yeso Hills RNA, Cave Resources SMA, Guadalupe Escarpment Scenic Area, Pecos River Corridor SMA, and the Springs Riparian Habitat Management Area (HMA) would still apply to the area. Table 4-186 provides mineral leasing options for this alternative by acres of land within the ACEC. The vast majority of the area would be open to leasable, salable, and locatable minerals with standard terms and conditions. Solar renewable energy development would be excluded from the majority of the area. Approximately 36% of the area would be open to wind development with the remainder designated as an avoidance area.

Under the No Action Alternative, travel would be OHV limited throughout most of the area (94%), with the remainder of the area closed to OHV travel. Grazing would be open on 94% of the area. Surface disturbance associated with resource development and use can introduce the following effects:

- Negatively impact fish, wildlife, and plant habitat;
- increase erosion of highly erodible soils;
- introduce sediment to streams and karst systems (thereby affecting habitat and karst function); and
- Negatively impact historical, cultural, and paleontological artifacts.

The No Action Alternative would maintain existing actions that open most of the area to mineral development and grazing. This would increase the potential for surface disturbance in the area, causing an increase in the above described effects for the area. These management actions would only protect some, but not all cultural, historic, paleontological, scenic, karst, and soil resources, as well as riparian and karst habitat, with indirect adverse effects to fish, wildlife, and special status plants that use those types of habitat. Therefore, this alternative would provide the least protection to the relevant and important values for the area.

Alternative A

Under Alternative A, 108,474 acres would be designated as the Carlsbad Chihuahuan Desert Rivers ACEC and would be managed to protect historic, cultural, scenic, fish and wildlife, karst, paleontological, riparian, soils, and special status plant resources. In addition, under this alternative, portions of the area would also be designated as the Cave Resources ACEC. In areas where both ACECs occur, the ACEC with more restrictive management actions takes precedence. See the analysis for the Cave Resources ACEC below for more information on management actions under this alternative.

Table 4-186 provides mineral leasing options for this alternative by acres of land within the ACEC. Over 65% of the ACEC would be open to mineral development (leasable, salable, and locatable minerals) under this alternative.

For Alternative A, renewable energy development would be open on 67% of the ACEC with 33% excluded from renewable energy development (see Table 4-187). The ACEC would require BMPs to protect scenic values, particularly along the Black River. Travel would be OHV limited for the majority of the acreage, with 1,953 acres would be closed to OHVs. Livestock grazing would be closed under this alternative. Compared

to the No Action Alternative, these management actions would help protect cultural, historic, paleontological, scenic, karst, and soil resources, as well as riparian and karst habitat, with indirect positive benefits to fish, wildlife, and special status plants that use those types of habitat. This alternative would preserve and provide the greatest protection to relevant and important values.

Alternatives B and C

Alternatives B and C would not designate the area as the Carlsbad Chihuahuan Desert Rivers ACEC, but instead would designate approximately 51% of the area as the Gypsum Soils ACEC. Effects to relevant and important values from those alternatives are discussed in the proposed Gypsum Soils ACEC section below.

Alternative D

Under Alternative D, this area would not be designated as an ACEC. Almost 90% of the area would be open to leasable, salable, and locatable mineral development (see Table 4-186) and 87% would be open to renewable energy development (see Table 4-187). For most of the area, travel would be OHV limited and livestock grazing would be open.

The area would be managed under existing prescriptions for riparian areas, floodplains, or wetlands. Existing prescriptions would also be used for cultural resources and threatened and endangered plant species. However, Alternative D would open most of the area to mineral, renewable energy development, and grazing. This would increase the potential for surface disturbance in the area, causing similar effects to those described under the No Action Alternative for the area. The existing prescriptions would only protect some, but not all cultural, historic, paleontological, scenic, karst, and soil resources, as well as riparian and karst habitat, with indirect adverse effects to fish, wildlife, and special status plants that use those types of habitat. Because much of the area is open to mineral leasing with standard terms and conditions, this alternative, along with the No Action Alternative, would have the greatest impact on the relevant and important values for the area.

Table 4-186. Mineral Leasing Options for the Carlsbad Chihuahuan Desert Rivers Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***108,483***	***108,474***	***108,472***	***108,473***	***108,484***
Leasable: open with standard terms and conditions	101,573 (94%)	71,191 (66%)	66,003 (61%)	73,759 (68%)	94,230 (87%)
Leasable: open with moderate constraints (CSU)	0	0	3,196 (3%)	22,719 (21%)	2,847 (3%)
Leasable: open with major constraints (NSO)	4,112 (4%)	10,225 (9%)	32,321 (30%)	5,629 (5%)	8,608 (8%)
Leasable: closed	2,799 (3%)	27,058 (25%)	6,952 (6%)	6,365 (6%)	2,799 (3%)
Salable: open with standard terms and conditions	102,881 (95%)	71,192 (66%)	68,866 (63%)	75,241 (69%)	95,345 (88%)
Salable: open with special terms and conditions (CSU)	0	0	419 (<1%)	20,213 (19%)	3,977 (4%)
Salable: avoid	0	0	0	0	0
Salable: closed	5,566 (5%)	37,290 (34%)	39,192 (36%)	12,981 (12%)	9,147 (8%)

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Locatable: open with standard terms and conditions	102,378 (94%)	77,487 (71%)	69,787 (64%)	96,452 (89%)	99,294 (92%)
Locatable: recommended for withdrawal	6,103 (6%)	30,955 (29%)	38,658 (36%)	11,993 (11%)	9,148 (8.4%)

Table 4-187. Renewable Energy Leasing within the Carlsbad Chihuahuan Desert Rivers Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***108,483***	***108,474***	***108,472***	***108,473***	***108,484***
Geothermal: open	4,631	71,181	68,472	73,750	94,223
Geothermal: close	103,833	37,278	40,003	34,725	14,255
Solar: variance	0	69,178 (64%)	66,439 (61%)	66,872 (62%)	90,513 (83%)
Solar: exclude	103,833 (96%)	34,649 (32%)	37,379 34%)	36,943 (34%)	13,316 (12%)
Wind: open	38,930 (36%)	68,679 (63%)	66,409 (61%)	71,113 (66%)	90,054 (83%)
Wind: avoid	64,903 (60%)	0	387 (<1%)	16,030 (15%)	2,998 (3%)
Wind: exclude	0	35,148 (32%)	37,027 (34%)	16,671 (15%)	10,770 (10%)

Cave Resources

The Cave Resources area contains important historic, cultural, fish and wildlife, and karst resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives A through D, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Cave Resources area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

Only the No Action Alternative would not designate the Cave Resources area as an ACEC and would not afford special management protection as the Cave Resources ACEC. However, under the No Action Alternative, existing special designations from the Chosa Draw ACEC, Dark Canyon ACEC, Dry Cave RNA, Cave Resources SMA, and Guadalupe Escarpment Scenic Area would continue to protect many of the relevant and important values for portions of the area. Table 4-188 provides mineral leasing options for this alternative by acres of land within the ACEC. Over 40% of the area would be open to leasable, salable, and locatable minerals with standard terms and conditions. Approximately 92% of the area would be excluded or designated as avoidance from solar and wind renewable energy development (see Table 4-189). Travel would be OHV limited throughout (595 acres would be closed). Livestock grazing would be open under the No Action Alternative.

Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact fish and wildlife habitat;
- introduce sediment to streams and karst systems (thereby affecting habitat and karst function); and
- negatively impact historical and cultural artifacts.

The No Action Alternative would maintain existing actions that open most of the area to mineral development, OHV travel, fire suppression, geophysical exploration, and grazing. This would increase the potential for surface disturbance in the area, causing an increase in the above described effects for the area. These management actions would only protect some, but not all cultural, historic, and karst resources, as well as riparian and karst habitat, with indirect adverse effects to fish and wildlife that use those types of habitat. Therefore, this alternative would provide the least protection to the relevant and important values for the area.

Alternatives A through D

Under Alternatives A through D, 19,625 acres would be designated as the Cave Resources ACEC and would be managed to protect historic, cultural, fish and wildlife, and karst resources. In addition, under Alternative A, portions of the area would also be designated as the Carlsbad Chihuahuan Desert Rivers ACEC, and for Alternatives B and C portions of the area would also be designated as the Gypsum Soils ACEC. In areas where both ACECs occur, the ACEC with more restrictive management actions takes precedence. See the analysis for the Carlsbad Chihuahuan Desert Rivers ACEC above and the Gypsum Soils ACEC below for more information on management actions under these alternatives.

Table 4-188 provides mineral leasing options for this alternative by acres of land within the ACEC. All of the action alternatives would apply limitations to minerals development: over 50% of the ACEC would leasable with major constraints only, and closed to saleable and withdrawn from locatable minerals development. Under this alternative, pipelines, transmission lines, and other linear infrastructure would be excluded from any unit of this ACEC except for valid existing rights. Renewable energy development would be excluded from or closed on all BLM-administered lands in the ACEC.

For Alternatives A through D, travel would be OHV limited (595 acres closed). Livestock grazing would be open for most of Alternatives A and B and all of Alternatives C and D.

Compared to the No Action Alternative, management actions under these alternatives would help protect cultural, historic, and karst resources, as well as karst habitat, with indirect positive benefits to fish and wildlife that use those types of habitat. Alternatives A and B would provide the greatest protection to these relevant and important values as a result of more land being closed to mineral development. However, all action alternatives would preserve the relevant and important historic, cultural, fish and wildlife, and karst values of the area.

Table 4-188. Mineral Leasing Options for the Cave Resources Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on all BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***19,625***	***19,625***	***19,625***	***19,625***	***19,625***
Leasable: open with standard terms and conditions	8,554 (44%)	0	0	0	0
Leasable: open with moderate constraints (CSU)	13 (< 1%)	0	0	0	0
Leasable: open with major constraints (NSO)	0	6,128 (31%)	6,112 (31%)	6,153 (31%)	8,538 (44%)
Leasable: closed	11,058 (56%)	13,497 (69%)	13,513 (69%)	13,473 (69%)	11,087 (56%)
Salable: open with standard terms and conditions	9,105 (46%)	0	0	0	0

Mineral Leasing Options on all BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Salable: open special terms and conditions (CSU)	0	0	0	15 (< 1%)	2,424 (12%)
Salable: avoid	0	0	0	0	0
Salable: closed	10,520 (54%)	19,625 (100%)	19,625 (100%)	19,610 (100%)	17,200 (88%)
Locatable: open with standard terms and conditions	11,079 (56%)	0	6 (< 1%)	798 (4%)	2,424 (12%)
Locatable: recommended for withdrawal	9,141 (47%)	19,625 (100%)	19,625 (100%)	18,827 (96%)	17,201 (88%)

Table 4-189. Renewable Energy Leasing within the Cave Resources Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***19,625***	***19,625***	***19,625***	***19,625***	***19,625***
Geothermal: open	1,475	-	-	798	799
Geothermal: close	18,150	19,625	19,625	18,827	18,827
Solar: variance	682 (3%)	0	0	0	0
Solar: exclude	18,150 (92%)	18,832(96%)	18,832 (96%)	18,832 (96%)	18,832 (96%)
Wind: open	0	0	0	0	0
Wind: avoid	18,237 (97%)	0	0	0	0
Wind: exclude	595 (3%)	18,832 (96%)	18,832 (96%)	18,832 (96%)	18,832 (96%)

Desert Heronries

The Desert Heronries area contains important avian wildlife resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternative B this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives A, C, and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Desert Heronries area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Desert Heronries area as an ACEC and would not afford special management protection as the Desert Heronries ACEC. However, existing special designations such as the Maroon Cliffs CRMA, and Phantom Banks Heronries SMA would continue to protect many of the relevant and important values for portions of the proposed area. Table 4-190 provides mineral leasing options for this alternative by acres of land within the ACEC. Approximately 37% of the area would be open to leasable and 43% salable minerals with standard terms and conditions and 100% of the area would be open to locatable minerals. All of the area would be closed or excluded from geothermal and solar renewable energy development and 65% of the area would be under avoidance for wind energy development (see Table 4-191).

The No Action Alternative also has stipulations that close areas within a 0.25-mile radius of active heronries from mineral disposal and oil and gas activities. OHV limited travel and livestock grazing would be designated throughout (81 acres closed for both travel and grazing).

Surface disturbance associated with resource development and use can negatively impact important wildlife habitat, such as the western soapberry (*Sapindus saponaria* var. *drummondii*) tree stands that are important habitat for nesting herons. The No Action Alternative would maintain existing actions that open most of the area to mineral development, OHV travel, fire suppression, geophysical exploration, and grazing. While this would increase the potential for surface disturbance in the area, the stipulations preventing mineral activities within 0.25 mile of any active heronries would help to protect active nesting areas. A study by Short and Cooper (1985) demonstrates the importance of buffers in minimizing disturbance to heronries during important life stages. These management actions would protect much, but not all heron nesting habitat, with some indirect adverse effects to herons that use certain habitats infrequently. However, because of the stipulations preventing activities near active nests, this alternative would preserve and protect some of the relevant and important wildlife values for the area.

Alternatives A, C, and D

Alternatives A, C, and D would not designate this area as the Desert Heronries ACEC and would be managed to protect wildlife resources. Table 4-190 provides mineral leasing options for this alternative by acres of land within the ACEC. Over 70% of the ACEC would be open to mineral development with standard terms and conditions (leasable, salable, and locatable minerals) under these alternatives, and over 70% of the area would be open for renewable energy development (see Table 4-191).

For Alternatives A, C and D, travel would be OHV limited, with 81 acres closed. Livestock grazing would be open for most of Alternative A and nearly all of Alternatives C and D. These alternatives would open most of the area to mineral development, renewable energy development, and grazing and would increase the potential for surface disturbance in the area. Compared to the No Action Alternative, management actions under these alternatives would have little protection for western soapberry stands that provide critical heron nesting habitat, with indirect adverse effects to herons. Therefore, alternatives would provide the least protection to the relevant and important values of the area.

Alternative B

Under Alternative B, 48,708 acres would be designated as the Desert Heronries ACEC and would be managed to protect wildlife resources. In addition, under this alternative, land in the area would also be designated as the Pope's Well ACEC. In areas where both ACECs occur, the ACEC with more restrictive management actions takes precedence. See the analysis for the Pope's Well ACEC below for more information on management actions under this alternative. Table 4-190 provides mineral leasing options for this alternative by acres of land within the ACEC. Over 70% of the ACEC would be open to mineral development with standard terms and conditions (leasable, salable, and locatable minerals) under this alternative, and over 70% of the ACEC would be open for renewable energy development (see Table 4-191). However, Alternative B also has stipulations that protect active heronries through NSO buffers of 820 feet throughout the year and 3,281-foot buffers from February to July, which is the critical nesting period. A study by Short and Cooper (1985) demonstrates the importance of buffers in minimizing disturbance to heronries during important life stages.

OHV limited travel would be designated throughout the ACEC, with 81 acres closed to OHVs. Livestock grazing would be closed. Surface disturbance associated with resource development and use can negatively impact important wildlife habitat, such as the western soapberry tree stands that are important habitat for nesting herons. Alternative B would open most of the area to mineral development, renewable energy development, and OHV limited travel. While this would increase the potential for surface disturbance in the area, the stipulations preventing mineral activities within 820 feet during most of the year and 3,281-foot buffers during nesting would help to protect active nesting areas. Similar to the No Action Alternative, these management actions would protect much, but not all, heron nesting habitat, with some indirect adverse effects to herons that use certain habitats infrequently. However, because of the stipulations preventing activities near active nests, this alternative would preserve and protect some of the relevant and important wildlife values in the ACEC.

Table 4-190. Mineral Leasing Options for the Desert Heronries Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***48,711***	***48,708***	***48,708***	***48,708***	***48,708***
Leasable: open with standard terms and conditions	18,149 (37%)	33,946 (70%)	33,946 (70%)	35,683 (73%)	37,785 (78%)
Leasable: open with moderate constraints (CSU)	29,761 (61%)	1,737 (4%)	1,737 (4%)	12,224 (25%)	10,122 (21%)
Leasable: open with major constraints (NSO)	801 (2%)	10,823 (22%)	13,025 (27%)	801 (2%)	801 (2%)
Leasable: closed	0 (0%)	2,202 (5%)	0	0	0
Salable: open with standard terms and conditions	20,736 (43%)	33,945 (70%)	33,945 (70%)	45,708 (94%)	47910 (98%)
Salable: open with special terms and conditions (CSU)	0	1,737 (4%)	1,737 (4%)	2,202 (5%)	0
Salable: avoid	0	0	0	0	0
Salable: closed	27,974 (57%)	13,025 (27%)	13,025 (27%)	801 (2%)	801 (2%)
Locatable: open with standard terms and conditions	48,711/ (100%)	35,682 (73%)	35683 (73%)	47,910 (98%)	47,910 (98%)
Locatable: recommended for withdrawal	0	13,025 (27%)	13,025 (27%)	801 (2%)	801 (2%)

Table 4-191. Renewable Energy Leasing within the Desert Heronries Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***48,475***	***48,472***	***48,471***	***48,472***	***48,471***
Geothermal: open	236	35,682	35,682	35,682	37,785
Geothermal: close	48,475	13,025	13,025	13,025	10,923
Solar: variance	0	35,447 (73%)	35,446 (73%)	35,446 (73%)	37,549 (77%)
Solar: exclude	48,475 (100%)	13,025 (27%)	13,025 (27%)	13,025 (27%)	10,923 (23%)
Wind: open	16,764 (34%)	33,709 (70%)	33,831 (70%)	35,446 (70%)	37,547 (77%)
Wind: avoid	31,710 (65%)	1,737 (3.5%)	1,615 (3.5%)	12,224 (25%)	10,122 (21%)
Wind: exclude	0	13,025 (27%)	13,025 (27%)	801 (2%)	801 (2%)

Note: The total geothermal acreage is greater than the ACEC acreage because it includes split estate subsurface acreage.

Gypsum Soils

The Gypsum Soils area contains important historic, cultural, scenic, fish and wildlife, karst, paleontological, riparian, soils, and special status plant resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives B and C, this area would be designated and managed as an ACEC to protect these values. However, Alternative A would designate most of the area as the Carlsbad Chihuahuan Desert Rivers ACEC instead. Under the No Action Alternative and Alternative D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Gypsum Soils area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Gypsum Soils area as an ACEC. However, existing special designations provided by the Chosa Draw ACEC, Yeso Hills RNA, Cave Resources SMA, Guadalupe Escarpment Scenic Area, Pecos River Corridor SMA, and the Springs Riparian HMA would still apply to the area. Under these existing special designations, NSO stipulations for future mineral leasing would apply, and future ROWs would either avoid sensitive habitat or would be excluded from within the areas. Table 4-192 provides mineral leasing options for this alternative by acres of land within the ACEC. The great majority of the area would be open to leasable, salable, and locatable minerals with standard terms and conditions. Geothermal and solar renewable energy development would be closed and excluded from the area. Approximately 16% of the area would be open to wind development with the remainder designated as an avoidance area for wind energy development (see Table 4-193).

Under the No Action Alternative, OHV travel would be limited throughout most of the area (92%), with the remainder of the area closed. Grazing would be open on 93% of the area. Most lands would be managed for VRM Class III or IV. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact fish, wildlife, and plant habitat;
- increase erosion of highly erodible soils;
- introduce structures that disrupt scenic viewsheds;
- introduce sediment to streams and karst systems (thereby affecting habitat and karst function); and
- negatively impact historical, cultural, and paleontological resources.

The No Action Alternative would maintain existing actions that open most of the area to mineral development, OHV travel, fire suppression, geophysical exploration, and grazing. This would increase the potential for surface disturbance in the area, causing an increase in the above described effects for the area. These management actions would only protect some, but not all cultural, historic, paleontological, scenic, karst, and soil resources, as well as riparian and karst habitat, with indirect adverse effects to fish, wildlife, and special status plants that use those types of habitat. Therefore, this alternative would provide little protection to the relevant and important values for the area.

Alternative A

Alternative A would designate the area as the Carlsbad Chihuahuan Desert Rivers ACEC. Approximately 35% of the area identified as the Gypsum Soils ACEC would be covered as the Carlsbad Chihuahuan Desert Rivers ACEC under Alternative A. Effects to relevant and important values from those alternatives are discussed in the proposed Carlsbad Chihuahuan Desert Rivers ACEC section above.

Alternatives B and C

Under Alternatives B and C, 62,553 acres would be designated as the Gypsum Soils ACEC and would be managed to protect historic, cultural, scenic, fish and wildlife, karst, paleontological, riparian, soils, and special status plant resources. In addition, under both alternatives, portions of the area would also be designated as the Cave Resources ACEC. In areas where both ACECs occur, the ACEC with more restrictive management actions takes precedence. See the analysis for the Cave Resources ACEC above for more information on management actions under this alternative.

Table 4-192 provides mineral leasing options for each action alternative by acres of land within the ACEC. Both alternatives would open leasable and salable mineral development on over 40% of the ACEC, with the remainder of the area either under moderate constraints, major constraints, or closed. Approximately 48% of the ACEC would be open to locatable mineral development under Alternative B and 83% under Alternative C.

Under Alternatives B and C, surface disturbance would not be allowed on slopes greater than 10%. Reserve pits would not be allowed in the ACEC under these alternatives. The ACEC would require BMPs to protect scenic values, such as requiring low profile (8 feet high or less) infrastructure in scenic areas. Renewable wind energy development would be open on 45% and 50% of the ACEC for Alternatives B and C, respectively (see Table 4-193). Travel would be OHV limited throughout with 2,229 acres closed to OHVs under Alternative B and 1,335 acres closed under Alternative C. Livestock grazing would be closed under Alternative B and open under most of Alternative C. Over 25,000 acres would be categorized as VRM Class II for Alternative B and over 11,000 acres under Alternative C. The remainder of the ACEC would be VRM Class III or IV for both alternatives. Under both alternatives, camping would be restricted to designated areas.

Alternatives B and C would open portions of the area to mineral development and renewable energy development. This would increase the potential for surface disturbance in the area, causing an increased potential for effects as described under the No Action Alternative in the area. However, management actions placed under these alternatives would help protect cultural, historic, paleontological, scenic, karst, and soil resources, as well as riparian and karst habitat, with indirect positive benefits to fish, wildlife, and special status plants that use those types of habitat. Compared to the No Action Alternative, designation of this ACEC under these alternatives would provide the greatest protection to these relevant and important values. Therefore, Alternatives B and C would preserve the relevant and important cultural, historic, paleontological, scenic, karst, and soil values in the ACEC.

Alternative D

Under Alternative D, this area would not be designated as an ACEC. Instead, the area would be managed under existing prescriptions for riparian areas, floodplains, or wetlands. Existing prescriptions would also be used for cultural resources and threatened and endangered plant species. Table 4-192 provides mineral leasing options for this alternative by acres of land within the ACEC. The great majority of the area would be open to leasable, salable, and locatable minerals with standard terms and conditions. Renewable energy development also would be open in much of the area (see Table 4-193).

Under Alternative D, OHV limited travel would be designated for most of the area (98%), with the remainder of the area closed. Grazing would be open on 98% of the area. Over 11,000 acres would be managed as VRM Class II under Alternative D. The remainder of the area would be VRM Class III or IV.

Alternative D would open most of the area to mineral development, renewable energy development, and grazing. This would increase the potential for surface disturbance in the area, causing an increased potential for effects as described under the No Action Alternative in the area. Similar to the No Action Alternative, there would be few management actions to protect cultural, historic, paleontological, scenic, karst, and soil resources, as well as riparian and karst habitat. Therefore, this alternative would have the greatest impact on the relevant and important values for the area. This alternative has the potential for adverse effects to sensitive soils, fish, wildlife, and special status plants that use those types of habitat and would provide the least protection to the relevant and important values.

Table 4-192. Mineral Leasing Options for the Gypsum Soils Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on all BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***65,564***	***65,562***	***65,553***	***65,554***	***65,564***
Leasable: open with standard terms and conditions	57,932 (92.5%)	32,575 (51%)	27,961 (44.7%)	33,947 (54%)	53997 (86%)
Leasable: open with moderate constraints (CSU)	0/0	0/0	2,970 (5%)	19,932 (32%)	371 (1%)
Leasable: open with major constraints (NSO)	4,833 (1.2%)	6,263 (10%)	27,531 (42%)	5,067 (8%)	8,397 (13%)
Leasable: closed	2,799 (4%)	26,723 (40%)	7,090 (10%)	6,608 (9%)	2,799 (7%)
Salable: open with standard terms and conditions	59,998 (96%)	32,576 (51%)	30,518 (47%)	33,969 (54%)	53,991 (86%)
Salable: open with special terms and conditions (CSU)	0	0	423 (1%)	19,750 (30%)	2,793 (<1%)
Salable: avoid	0	0	0	0 (1.6%)	0 (<1%)
Salable: closed	5,562 (9%)	32,988 (53%)	34,623 (55.6%)	11,831 (19%)	8,771 (14%)
Locatable: open with standard terms and conditions	59,462 (95%)	36,154 (57.5%)	31,148 (50%)	53,891 (86%)	56,790 (90.6%)
Locatable: recommended for withdrawal	6,100 (3%)	29,404 (44%)	34,412 (52%)	11,668 (17%)	8,766 (16%)

Table 4-193. Renewable Energy Leasing within the Gypsum Soils Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***65,564***	***65,562***	***65,553***	***65,564***	***65,564***
Geothermal: open	3,250	32,565	30,493	33,945	53,991
Geothermal: close	62,302	32,985	35,070	31,617	11,571
Solar: variance	0	31,613 (51%)	29,507 (47%)	29,627 (48%)	51,756 (83%)
Solar: exclude	62,302 (100%)	30,687 (49%)	32,784 (53%)	32,658 (52%)	10,541 (17%)
Wind: open	10,590 (17%)	31,198 (50%)	25,539 (41%)	32,493 (52%)	51,355 (83%)
Wind: avoid	51,711 (83%)	0	18 (74.5%)	14,563 (23%)	381 (1%)
Wind: exclude	0	31,102 (50%)	32,735 (52%)	15,233 (24%)	10,556 (16%)

Laguna Plata

The Laguna Plata area contains important cultural and wildlife resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under

Alternatives A and B, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative, Alternative C, and Alternative D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Laguna Plata area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Laguna Plata area as an ACEC. However, existing special designations under the Laguna Plata SMA would continue to protect many of the relevant and important values for portions of the proposed area. Under these existing special designations, NSO stipulations for future mineral leasing would apply, and future ROWs would either avoid sensitive habitat or would be excluded from within the areas. Table 4-194 provides mineral leasing options for this alternative by acres of land within the ACEC. The vast majority of the area would be open to major constraints to leasable minerals and closed to salable minerals. The entire area would be open to locatable minerals with standard terms and conditions. Geothermal would be managed as closed and solar renewable energy development would be excluded from the area. Only 1% of the area would be open to wind development with the remainder managed as an avoidance area for wind energy development (see Table 4-195).

Under the No Action Alternative, OHV travel would be closed on 67% of the area, with the remainder of the area as OHV. Grazing would be open on the entire area. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife habitat and
- negatively impact cultural artifacts.

The No Action Alternative would continue existing conditions that limit mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration in most of the area. This would reduce the potential for surface disturbance in the area, allowing for increased protection of cultural and wildlife resources. Management actions under this alternative would help protect cultural resources within the Laguna Plata Archeological District and wildlife habitat for the western snowy plover. Therefore, the No Action Alternative would preserve and protect the relevant and important cultural and wildlife values for the area.

Alternatives A and B

Under Alternatives A and B, 4,496 acres would be designated as the Laguna Plata ACEC and would be managed to protect cultural and wildlife resources. Under Alternative, B, the entire acreage of the Laguna Plata ACEC would be within the boundaries of the Salt Playas ACEC. In areas where both ACECs occur, the ACEC with more restrictive management actions takes precedence. See the analysis for the Salt Playas ACEC below for more information on management actions under this alternative. Table 4-194 provides mineral leasing options for this alternative by acres of land within the ACEC. The majority of the area would be open to major constraints to leasable minerals, closed to salable minerals development, and withdrawn from locatable minerals. Renewable energy development would be managed as closed or excluded from the area (see Table 4-195).

For Alternatives A and B, OHV travel, fire suppression, and geophysical exploration would be limited to existing trails. Grazing would be open on the entire area for Alternative A and closed for Alternative B. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife habitat and
- negatively impact cultural artifacts.

Both alternatives would limit mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration in most of the area. Similar to the No Action Alternative, management actions under these alternatives would help protect cultural resources within the Laguna Plata Archeological District and wildlife habitat for the western snowy plover. Alternatives A and B would preserve and provide the greatest protection to the relevant and important cultural and wildlife values of the area.

Alternatives C and D

Alternatives C and D would not designate this area as the Laguna Plata ACEC. Table 4-194 provides mineral leasing options for this alternative by acres of land within the ACEC. The entire area would be open with major constraints to leasable and salable minerals and withdrawn from locatable minerals. Renewable energy development would be managed as closed or excluded from the area (see Table 4-195).

For Alternatives C and D, OHV travel would be limited to existing trails. Grazing would be open on the entire area for both alternatives. Similar to the No Action Alternative, both alternatives would limit mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration in most of the area. Management actions under these alternatives would help protect cultural resources within the Laguna Plata Archeological District and wildlife habitat for the western snowy plover. Therefore, Alternatives C and D would preserve and protect the relevant and important cultural and wildlife values of the area.

Table 4-194. Mineral Leasing Options for the Laguna Plata Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***4,496***	***4,496***	***4,496***	***4,496***	***4,496***
Leasable: open with standard terms and conditions	0	0	0	0	0
Leasable: open with moderate constraints (CSU)	41 (< 1%)	1,299 (29%)	0	0	0
Leasable: open with major constraints (NSO)	3,659 (81%)	2,401 (53%)	2,401 (53%)	4,496 (100%)	4,496 (100%)
Leasable: closed	796 (18%)	796 (18%)	796 (18%)	0	0
Salable: open with standard terms and conditions	41 (1%)	0	0	0	0
Salable: open with special terms and conditions	0	0	0	0	0
Salable: avoid	0	0	0	0	0
Salable: closed	4,455 (99%)	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)
Locatable: open with standard terms and conditions	4,496 (100%)	0	0	0	0
Locatable: recommended for withdrawal	0	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)

Table 4-195. Renewable Energy Leasing within the Laguna Plata Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***4,496***	***4,496***	***4,496***	***4,496***	***4,496***
Geothermal: open	0	0	0	0	0
Geothermal: close	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)
Solar: variance	0	0	0	0	0
Solar: exclude	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)
Wind: open	41 (1%)	0	0	0	0
Wind: avoid	4,455 (99%)	0	0	0	0
Wind: exclude	0	4,496 (100%)	4,496 (100%)	4,496 (100%)	4,496 (100%)

Lonesome Ridge

The Lonesome Ridge area contains important scenic, wildlife, geologic, and karst resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under the No Action Alternative and Alternatives A through D, this area would be designated and managed as an ACEC to protect these values. In addition, the Lonesome Ridge WSA overlaps portions of the ACEC and provides additional protections under all alternatives. Impacts to the Lonesome Ridge area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action would continue designation of the Lonesome Ridge area as an ACEC. Therefore, this ACEC would continue to protect the scenic, wildlife, geologic, and karst resources in the area. For the No Action Alternative, 41 acres would be open to leasable minerals with major constraints. The remainder of the ACEC would be closed for leasable minerals. The No Action Alternative would be closed to salable and locatable minerals development. Only 4% of the area would be managed as an avoidance area for wind development with the remainder closed for wind energy development.

OHV travel, fire suppression, and geophysical exploration would be OHV Limited on 41 acres, with the remainder closed to OHVs. Livestock grazing would be open for all of the Lonesome Ridge area under the No Action Alternative. Most of the area would be managed as VRM Class I, with 41 acres managed as VRM Class II.

The No Action Alternative would continue existing actions that limit mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration in most of the area. This would reduce the potential for surface disturbance in the area, allowing for increased protection of scenic, wildlife, geologic, and karst resources. Therefore, the No Action Alternative would preserve and protect the relevant and important scenic, wildlife, geologic, and karst values for the area.

Alternatives A through D

Under Alternatives A through D, 3,021 acres would be designated as the Lonesome Ridge ACEC and would be managed to protect scenic, wildlife, geologic, and karst resources. Under these alternatives, all leasable, salable, and locatable minerals would be closed, and the area would be managed as closed or excluded from renewable energy development.

On all alternatives, OHV travel, fire suppression, and geophysical exploration would be closed. Livestock grazing would be open for all alternatives. Most of the area would be managed as VRM Class I, with 41 acres managed as VRM Class II under Alternative B. Similar to the No Action Alternative, management

actions under these alternatives would help protect the scenic, wildlife, geologic, and karst resources. The measures would help protect the unique scenery of the Guadalupe Escarpment, rare habitat for nesting birds, and several caves. These alternatives would preserve the relevant and important scenic, wildlife, geologic, and karst values of the area.

Maroon Cliffs

The Maroon Cliffs area contains important cultural resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternative B this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives A, C, and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Maroon Cliffs area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Maroon Cliffs area as an ACEC. However, under the No Action Alternative, existing restrictions under the Maroon Cliffs CRMA/SMA would continue to protect many of the relevant and important values for portions of the proposed area. Table 4-196 provides mineral leasing options for this alternative by acres of land within the ACEC. For the No Action Alternative, 12 acres would be open to leasable, salable, and locatable minerals with standard terms and conditions and 8,647 acres would be open to leasable minerals with major constraints. The alternatives would close 8,647 acres to salable and locatable minerals. Geothermal and solar renewable energy development would be closed and excluded, respectively, from the area. The area would be an avoidance area for wind energy development (see Table 4-197).

Under the No Action Alternative, OHV limited travel would be designated throughout the area. Grazing would be open for the entire area. Surface disturbance associated with resource development and use can negatively impact cultural artifacts and sites. The No Action Alternative would continue existing actions that limit mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration in most of the area. This would reduce the potential for surface disturbance in the area, allowing for increased protection of cultural resources. Management actions under this alternative would help protect cultural resources in the Maroon Cliffs area. Therefore, the No Action Alternative would preserve and protect the relevant and important cultural and wildlife values for the area.

Alternatives A, C, and D

Alternatives A, C, and D would not designate this area as the Maroon Cliffs ACEC. Table 4-196 provides mineral leasing options for this alternative by acres of land within the ACEC. Most of the entire area would be open to leasable with major constraints, and closed to salable and withdrawn from locatable development. Renewable energy development would be closed or excluded from the area (see Table 4-197).

Alternatives A, C, and D would apply OHV limited travel throughout the area. Livestock grazing would be open. Surface disturbance associated with resource development and use can negatively impact cultural artifacts and sites. Similar to the No Action Alternative, Alternatives A, C, and D would limit mineral development, renewable energy development, OHV travel, fire suppression, and geophysical exploration in most of the area. This would reduce the potential for surface disturbance in the area, allowing for increased protection of cultural resources. Management actions under this alternative would help protect cultural resources in the Maroon Cliffs area. Alternatives A, C, and D would provide the least protection to the relevant and important values of this area, but would still protect and preserve the relevant and important cultural values.

Alternative B

Under Alternative B, 8,659 acres would be designated as the Maroon Cliffs ACEC and would be managed to protect cultural resources. Table 4-196 provides mineral leasing options for this alternative by acres of land within the ACEC, with the same minerals prescriptions as the other action alternatives.

For Alternative B, travel and livestock grazing would be the same as the other action alternatives. Surface disturbance associated with resource development and use can negatively impact cultural artifacts and sites. Similar to the No Action Alternative, management actions under this alternative would help protect cultural resources within the Maroon Cliffs Archeological District. Surface-disturbing activities under this alternative would be coordinated with the New Mexico SHPO. Alternative B would provide the greatest protection to and would preserve the relevant and important cultural values.

Table 4-196. Mineral Leasing Options for the Maroon Cliffs Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***8,659***	***8,659***	***8,659***	***8,659***	***8,659***
Leasable: open with standard terms and conditions	12 (<1%)	0	0	0	0
Leasable: open with moderate constraints (CSU)	0	0	0	0	0
Leasable: open with major constraints (NSO)	8,647 (99.8%)	8,659 (100%)	8,659 (100%)	8,659 (100%)	8,659 (100%)
Leasable: closed	0	0	0	0	0
Salable: open with standard terms and conditions	12 (<1%)	0	0	0	0
Salable: open special terms and conditions (CSU)	0	0	0	0	0
Salable: avoid	0	0	0	0	0
Salable: closed	8,647 (99%)	8,659 (100%)	8,659 (100%)	8,659 (100%)	8,659 (100%)
Locatable: open with standard terms and conditions	8,659 (100%)	0	0	0	0
Locatable: recommended for withdrawal	0	8,659 (100%)	8,659 (100%)	8,659 (100%)	8,659 (100%)

Table 4-197. Renewable Energy Leasing within the Maroon Cliffs Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	8,659	8,659	8,659	8,659	8,659
Geothermal: open	0	0	0	0	0
Geothermal: close	8,659	8,659	8,659	8,659	8,659
Solar: variance	0	0	0	0	0
Solar: exclude	8,659 (100%)	8,659 (100%)	8,659 (100%)	8,659 (100%)	8,659 (100%)
Wind: open	0	0	0	0	0
Wind: avoid	8,659 (100%)	0	0	0	0
Wind: exclude	0	8,659 (100%)	8,659 (100%)	8,659 (100%)	8,659 (100%)

Pecos Bluntnose Shiner

The Pecos Bluntnose Shiner area contains important fish resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives A through D, this area would be designated and managed as an ACEC to protect these values. However,

under the No Action Alternative, the area would be managed as an HMA with existing management direction as provided for in the 1988 RMP. Impacts to the Pecos Bluntnose Shiner area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would continue designation of the Pecos Bluntnose Shiner area (201 acres) as the Bluntnose Shiner HMA, not as an ACEC. For the No Action Alternative, all acres would be open to leasable minerals with major constraints and would be closed to salable and locatable minerals. Geothermal energy development would be closed in the area and solar energy development would be excluded from the area. The area would be managed as an avoidance area for wind energy development. OHV travel would be limited and livestock grazing would be open for all of the Pecos Bluntnose Shiner area under the No Action Alternative. Surface disturbance associated with resource development and use can negatively impact fisheries habitat, either directly or by introduce sediment or contaminants to streams, thereby affecting habitat. Management actions under the No Action Alternative would help protect fish resources. These measures would help protect the unique habitat for the Pecos bluntnose shiner in the area, though grazing would have adverse impact, and would preserve the relevant and important fish values in the area.

Alternatives A through D

Under Alternatives A through D, 201 acres would be designated as the Pecos Bluntnose Shiner ACEC and would be managed to protect fish resources. Under Alternatives A and B, all leasable, salable, and locatable minerals would be closed. Renewable energy development would be excluded for both alternatives. OHV travel would be limited and livestock grazing would be closed.

Alternative C would have leasable minerals open with major constraints and all salable and locatable minerals closed. Alternative D would have all acres open to leasable minerals with moderate constraints and all salable and locatable minerals closed. Renewable energy development would be closed or excluded for Alternative C. The ACEC would be managed as closed to geothermal, excluded from solar, and avoided from wind energy development under Alternative D. OHV travel would be limited and livestock grazing would be closed for both alternatives.

Surface disturbance associated with resource development and use can negatively impact fisheries habitat, either directly through destruction and alteration of habitat or by introducing sediment or contaminants to streams. Management actions under these alternatives would help protect fish resources. Similar to the No Action Alternative, these measures would help protect the unique habitat for the Pecos bluntnose shiner in the area and would preserve the relevant and important fish values in the ACEC.

Pecos River Canyon Complex

The Pecos River Canyons Complex area contains important scenic and plant resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under the No Action Alternative and Alternatives A through C, this area would be designated and managed as an ACEC to protect these values. However, under Alternative D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Pecos River Canyons Complex area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would continue designation of the Pecos River Canyon Complex area (5,688 acres) as an ACEC. Under these existing special designations, NSO stipulations for future mineral leasing would apply, and future ROWs would either avoid sensitive habitat or would be excluded from within the areas. Table 4-198. provides mineral leasing options for this alternative by acres of land within the ACEC. Approximately 25% of the area would be open to leasable and minerals with standard terms and conditions; the area would be closed to salable and locatable minerals development. Geothermal and solar renewable energy development would be closed and excluded from the area. Approximately 5% of the area would be an avoidance area for wind development with the remainder designated as an exclusion area for wind energy development (see Table 4-199).

Under the No Action Alternative, travel would be OHV limited and 942 acres closed. Grazing would be open on the entire area. The ACEC would be managed for VRM Class II. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact plant habitat and
- introduce structures that disrupt scenic viewsheds

The No Action Alternative would maintain existing actions that open some of the area to mineral development and all of the area to grazing. This would increase the potential for surface disturbance in the area, causing an increase in the above described effects for the area. These management actions would protect some, but not all scenic and plant resources. This alternative would provide some protection to the relevant and important values of the area.

Alternatives A through C

Under Alternatives A through C, 4,115 acres would be designated as the Pecos River Canyon Complex ACEC and would be managed to protect scenic and plant resources. Table 4-198. provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. The entire area would be open with major constraints for leasable minerals, closed for salable minerals, and withdrawn from locatable mineral entry. The area would also be closed or excluded from renewable energy development (see Table 4-199). Under Alternatives A through C, travel would be OHV limited and livestock grazing would be open on most of the area for these Alternatives. All of the ACEC under Alternatives A and B would be managed as VRM Class II. Alternative C maintains most of the ACEC as VRM Class II (55% or 2,276 acres) with the remainder VRM Class III. Collecting plants, rocks, and fossils would be prohibited in the ACEC under all alternatives. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact plant habitat and
- introduce structures that disrupt scenic viewsheds

Compared to the No Action Alternative, management actions under these alternatives would help protect the scenic and plant resources. The measures would help protect the unique scenery of Pierce and Cedar Canyons and rare habitat for Tharp's bluestar. These alternatives would preserve the relevant and important scenic and plant values of the area.

Alternative D

Alternative D would not designate the area as the Pecos River Canyon Complex ACEC. Instead the area would be managed consistent with the management prescriptions for the surrounding area. Table 4-198. provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. Approximately 90% of the area would be open to leasable, salable, and locatable minerals with standard terms and conditions. Renewable energy development would also be managed as variance (solar) or open (wind and geothermal) on 90% of the area (see Table 4-199).

Alternative D maintains most of the ACEC as VRM Class II (2,276 acres) with the remainder VRM Class III (the same as Alternative C). Travel would be OHV limited and livestock grazing would be open for this alternative. There would be no restrictions on plant and rock collection in the area. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact plant habitat and
- introduce structures that disrupt scenic viewsheds

This alternative would protect the plant relevant and important values, but would provide little protection to relevant and important scenic values. Under this alternative, there are few restrictions on surface-disturbing activities, which would introduce structures and other development that would degrade scenic viewsheds.

Table 4-198. Mineral Leasing Options for the Pecos River Canyons Complex Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Surface Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***5,688***	***4,115***	***4,115***	***4,115***	***4,115***
Leasable: open with standard terms and conditions	1,366 (33%)	0	0	0	3,696 (90%)
Leasable: open with moderate constraints (CSU)	0	0	0	0	1 (<1%)
Leasable: open with major constraints (NSO)	2,743 (67%)	4,115 (100%)	4,115 (100%)	4,115 (100%)	418 (10%)
Leasable: closed	0	0	0	0	0
Salable: open with standard terms and conditions	15 (<1%)	0	0	0	3,697 (90%)
Salable: open with moderate constraints (CSU)	0	0	0	0	0
Salable: avoid	0	0	0	0	0
Salable: closed	4,100 (99%)	4,115 (100%)	4,115 (100%)	4,115 (100%)	418 (10%)
Locatable: open with standard terms and conditions	1,371 (33%)	0	0	0	3,697 (90%)
Locatable: recommended for withdrawal	2,743 (67%)	4,115 (100%)	4,115 (100%)	4,115 (100%)	418 (10%)

Table 4-199. Renewable Energy Leasing within the Pecos River Canyons Complex Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	5,688	4,115	4,115	4,115	4,115
Geothermal: open	0	0	0	0	3,696 (90%)
Geothermal: close	5,688	4,115	4,115	4,115	418
Solar: variance	0	0	0	0	3,696 (90%)
Solar: exclude	5,688 (100%)	4,115 (100%)	4,115 (100%)	4,115 (100%)	419 (10%)
Wind: open	0	0	0	0	1 (< 1%)
Wind: avoid	570 (10%)	0	0	0	1 (<1%)
Wind: exclude	5,118 (90%)	4,115 (100%)	4,115 (100%)	4,115 (100%)	418 (10%)

Pope's Well

The Pope's Well area contains important historic resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives B and C, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives A and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Pope's Well area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would continue designation of the Pope's Well area as an SMA. Therefore, this SMA would continue to protect the historic resources in the area. For the No Action Alternative, all acres would be open to leasable minerals with major constraints and would be closed to salable minerals and withdrawn from locatable minerals entry. Geothermal and solar energy development would be closed or excluded from the area and the area would be an avoidance area for wind energy development.

OHV travel, fire suppression, and geophysical exploration would be closed in the area and livestock grazing would be closed for all acres of the No Action Alternative. Surface disturbance associated with resource development and use can negatively impact historic sites and artifacts. I this alternative closes the entire area to surface disturbance, it would preserve and provide protection to the relevant and important historic values of the area.

Alternatives A and D

Alternatives A and D would not designate the area as the Pope's Well ACEC. For both alternatives, all acres would be open to leasable minerals with major constraints and would be closed to salable minerals and withdrawn from locatable minerals entry. Geothermal, solar, and wind energy development would be closed and excluded from the area.

OHV travel, fire suppression, and geophysical exploration would be closed in the area and livestock grazing would be closed for all acres of both alternatives. Surface disturbance associated with resource development and use can negatively impact historic sites and artifacts. The impacts would be similar to those discussed for the No Action Alternative because Alternatives A and D close the entire area to surface disturbance, they would preserve and protect the relevant and important historic values of the area.

Alternatives B and C

Under Alternatives B and C, 81 acres would be designated as the Pope's Well ACEC and would be managed to protect historic resources. In addition, under Alternative B, land in the area would also be designated as the Desert Heronries ACEC. In areas where both ACECs occur, the ACEC with more restrictive management actions takes precedence. See the analysis for the Desert Heronries ACEC above for information on management actions under this alternative. For both alternatives, all acres would be open to leasable minerals with major constraints and would be closed to salable minerals and withdrawn from locatable minerals entry. Geothermal, solar, and wind energy development would be closed and excluded from the area.

OHV travel, fire suppression, and geophysical exploration would be closed in the area and livestock grazing would be closed for all acres of both alternatives. Surface disturbance associated with resource development and use can negatively impact historic sites and artifacts. The impacts would be similar to the No Action Alternative because Alternatives B and C close the entire area to surface disturbance, they would preserve and protect the relevant and important historic values of the area.

Salt Playas

The Salt Playas area contains important cultural, fish, and wildlife resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternative B, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives A, C, and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Salt Playas area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Salt Playas area as an ACEC. However, existing special designations (Laguna Plata Archeological District) would continue to protect the cultural resources for portions of the proposed area. Table 4-200 provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. Most of the acreage for the No Action Alternative would

be open with standard terms and conditions for leasable, salable, and locatable minerals. Geothermal and solar energy development would be closed or excluded from the area and 57% of the area would be open for wind energy development (see Table 4-201).

Travel would be OHV limited on 93% of the rest closed to OHVs. Livestock grazing would be open for the entire area under the No Action Alternative. This would increase the potential for surface disturbance at cultural resource sites and important playa habitat for fish and wildlife. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact fish and wildlife habitat;
- introduce sediment to streams (thereby affecting fish habitat); and
- negatively impact cultural artifacts.

While the existing special designation would protect cultural resources in the archeological district, fish and wildlife habitat in other portions of the playas would have little protection from surface disturbance or from changes to water levels during spring and early summer nesting periods. Therefore, this alternative would provide the least protection to the relevant and important, fish, and wildlife values of the area.

Alternatives A, C, and D

Alternatives A, C, and D would not designate this area as the Salt Playas ACEC. Table 4-200 provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. The majority of acreage for these alternatives, mineral leasing would be open with standard terms and conditions for leasable, salable, and locatable minerals. Approximately 86% of the area would be managed as open to geothermal and wind and managed as a variance area for solar energy development.

For all three alternatives, OHV travel would be limited. Livestock grazing would be open for all three alternatives. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact fish and wildlife habitat;
- introduce sediment to streams (thereby affecting fish habitat); and
- negatively impact cultural artifacts.

This would increase the potential for surface disturbance at cultural resource sites and important playa habitat for fish and wildlife. However, there would be some restrictions on the area to protect important values. Compared to the No Action Alternative, Alternatives A, C and D would provide more protection to the relevant and important values of this area. However, habitat for fish and wildlife resources that depend on the playas and cultural resources in the area would have little protection from surface disturbance, thus increasing the potential for adverse effects to those resources. These alternatives would provide little protection to the relevant and important cultural, fish, and wildlife values of the area.

Alternative B

Under Alternative B, 49,772 acres would be designated as the Salt Playas ACEC and would be managed to protect cultural, fish, and wildlife resources. In addition, 4,699 acres of the area would also be designated as the Laguna Plata ACEC under this alternative. On those acres, the BLM would apply the most restrictive actions to protect relevant and important wildlife and cultural resources. See the analysis for the Laguna Plata ACEC above for more information on management actions under this alternative. Table 4-200 provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. Leasable mineral development would be either open with major constraints or closed, salable minerals would be closed, and locatable minerals withdrawn from mineral entry. The area would also be managed as closed to geothermal and excluded from solar and wind energy development (see Table 4-201).

OHV travel would be limited for the entire area. Livestock grazing would be open for all of Alternative B. These restrictions would minimize surface disturbance in the area and would help to protect cultural resource sites and important playa habitat for fish and wildlife. Management actions under this alternative would help protect the cultural, fish, and wildlife resources within the Salt Playas ACEC. Compared to the No Action Alternative, this alternative would preserve and provide the greatest protection to the relevant and important cultural, fish, and wildlife values of the ACEC.

Table 4-200. Mineral Leasing Options for the Salt Playas Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***49,203***	***49,203***	***49,199***	***49,203***	***49,203***
Leasable: open with standard terms and conditions	20,360 (42%)	20,203 (41.5%)	0	20,203 (41.5%)	33,206 (68%)
Leasable: open with moderate constraints (CSU)	22,713 (45.6%)	23,971 (48%)	25 (< 1%)	22,829 (46%)	12,070 (24%)
Leasable: open with major constraints (NSO)	3,659 (7%)	2,401 (8%)	35,582 (94%)	6,740 (14%)	4,496 (9%)
Leasable: closed	3,040 (6%)	3,197 (4.8%)	14,165 (28%)	0 (< 1%)	0
Salable: open with standard terms and conditions	45,316 (92%)	22,672 (47%)	1 (< 1%)	20,203 (41.5%)	33,251 (68%)
Salable: open with special terms and conditions (CSU)	0	20,203 (41%)	47 (< 1%)	22,829 46%)	12,024 (24%)
Salable: avoid	0	0	0	0	0
Salable: closed	4,455 (9%)	6,897 (14%)	49,724 (100%)	6,740 (14%)	4,496 (9%)
Locatable: open with standard terms and conditions	49,771 (100%)	42,875 (87%)	0	45,276 (92%)	45,276 (92%)
Locatable: recommended for withdrawal	0	6,897 (14%)	49,772 (100%)	4,49 (9%)	4,49 (9%)

Table 4-201. Renewable Energy Leasing within the Salt Playas Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	***49,203***	***49,203***	***49,199***	***49,203***	***49,203***
Geothermal: open	569	42,875	-	42,874	43,031
Geothermal: close	49,203	6,897	49,771	6,897	6,740
Solar: variance	0	42,386 (86%)	0	42,386 (86%)	42,543 (86%)
Solar: exclude	49,203 (100%)	6,817 (14%)	49,199 (100%)	6,817 (14%)	6,660 (14%)
Wind: open	27,839 (57%)	20,162 (41%)	0	20,162 (41%)	20,319 (41%)
Wind: avoid	21,364 (43%)	22,224 (45%)	0	22,381 (45%)	24,388 50%
Wind: exclude	0	6,817 (14%)	49,199 (100%)	6,660 (13%)	4,496 (10%

Serpentine Bends

The Serpentine Bends area contains important historic, scenic, wildlife, and plant resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives A through D, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative, the area would be managed in accordance with existing special designations and the management direction provided for other resources and resource uses. Impacts to the Serpentine Bends area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Serpentine Bends area (5,019 acres) as an ACEC. However, existing special designations under the Dark Canyon ACEC, Cave Resources SMA, and Dark Canyon Scenic Area would continue to protect the historic, scenic, wildlife, and plant resources for portions of the proposed area. For the No Action Alternative, 1 acre would be open to leasable development, 804 acres for salable, and 809 acres for locatable minerals with standard terms and conditions and 5,018 acres closed to leasable, and approximately 4,215 closed/withdrawn from salable and locatable minerals. Solar energy development would be managed as excluded on 4,195 acres. The remainder (21 acres) would be managed as a variance area for solar development. Wind energy development would be avoided on 3,578 acres and 638 acres excluded from wind energy development.

Travel would be OHV limited on 3,578 acres, while 638 acres would be closed to all OHV travel. Fire suppression, and geophysical exploration would be open on 3,578 acres. Livestock grazing would be open on 4,216 acres of the Serpentine Bends area under the No Action Alternative. Most lands would be managed for VRM Class I (638 acres), II (3,892 acres), or III (492 acres). Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- introduce structures that disrupt scenic viewsheds; and
- negatively impact cultural artifacts.

I the No Action Alternative closes nearly the entire area to surface disturbance, these measures would help protect the unique scenery of adjacent to Carlsbad Caverns National Park, rare habitat for snakes and nesting raptors, and special status plants. Therefore, the No Action Alternative would preserve the relevant and important historic, scenic, wildlife, and plant resources of the area.

Alternatives A through D

Under Alternatives A through D, 5,019 acres would be designated as the Serpentine Bends ACEC and would be managed to protect scenic, wildlife, geologic, and karst resources. Under these alternatives, leasable, salable, and locatable minerals would be closed on the entire area. Renewable energy development would also be closed or excluded from the area.

On 3,578 acres for all four action alternatives, travel would be OHV limited, with the remainder (638 acres) closed to OHVs. Livestock grazing would be open for all alternatives. The majority of the ACEC under Alternatives A, C, and D (4,381 acres) would be managed as VRM Class II, and all of Alternative B would be managed as VRM Class I. Management actions under these alternatives would help protect the historic, scenic, wildlife, and plant resources. Similar to the No Action Alternative, the measures would help protect the unique scenery of adjacent to Carlsbad Caverns National Park, rare habitat for snakes and nesting raptors, and special status plants. Therefore, these alternatives would preserve the relevant and important scenic, wildlife, geologic, and karst values of the area.

Seven Rivers Hills

The Seven Rivers Hills area contains important scenic, wildlife, karst, soils, and special status plant resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR

1610.7-2 and BLM Manual 1613. Under Alternative B, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives A, C, and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Seven Rivers Hills area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Seven Rivers Hills area (1,027 acres) as an ACEC. However, existing management actions under the Seven Rivers Hills SMA would continue to protect the scenic, wildlife, karst, soils, and special status plant resources for portions of the proposed area. Table 4-202 provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. For the No Action Alternative, 391 acres would be open to leasables, 505 acres open to salables and locatable minerals with standard terms and conditions, and 636 acres would be open to leasable minerals with major constraints. Approximately 522 acres would also be closed to salable and locatable minerals. Geothermal and solar energy development would be managed as closed and excluded on entire area and wind energy development would be avoided within the area.

The area would be OHV limited throughout and livestock grazing would be open for all of the No Action Alternative. This alternative would designate 644 acres as VRM Class II, 56 acres as VRM Class III, and the remainder (254 acres) as VRM Class IV. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- increase erosion of highly erodible soils;
- introduce structures that disrupt scenic viewsheds; and
- introduce sediment to karst systems (thereby affecting karst function).

I half of the area is open to mineral development and grazing, habitat for wildlife and special status plants and karst and soil resources would have little protection from surface disturbance, thus increasing the potential for adverse effects to those resources. Therefore, this alternative would provide the least protection to the relevant and important scenic, wildlife, karst, special status plants, and soil values of the area.

Alternative A

Alternative A would not designate this area as the Seven Rivers Hills ACEC. Table 4-202 provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. For Alternative A, 148 acres would be open to leasables, and 535 acres would be open to salable, and locatable minerals with standard terms and conditions, and the remainder of the area would be closed. Approximately 462 acres would be managed as open to wind and 72 acres would be open to geothermal energy development. Approximately 462 acres would also be managed as a variance area for solar energy development. Under Alternative A, 492 acres closed or excluded from renewable energy development, with the exception of geothermal (see Table 4-203).

OHV travel would be limited and livestock grazing would be open for all of Alternative A. This alternative would designate 644 acres as VRM Class II, 56 acres as VRM Class III, and the remainder (254 acres) VRM Class IV. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- increase erosion of highly erodible soils;
- introduce structures that disrupt scenic viewsheds; and
- introduce sediment to karst systems (thereby affecting karst function).

Similar to the No Action Alternative, because half of the area is open to mineral development and grazing, habitat for wildlife and special status plants and karst and soil resources would have little protection from surface disturbance, thus increasing the potential for adverse effects to those resources. Therefore, this alternative would provide little protection to the relevant and important scenic, wildlife, karst, special status plants, and soil resources of the area.

Alternatives B, C, and D

Under Alternatives B, C, and D, 1,027 acres would be designated as the Seven Rivers Hills ACEC and would be managed to protect scenic, wildlife, karst, soils, and special status plant resources. Table 4-202 provides mineral leasing options for each action alternative by acres of BLM-administered land within the ACEC. Leasable minerals would be open with major constraints, salable minerals would be closed (Alternative B would open 72 acres for salable development), and locatable minerals withdrawn from mineral entry under this alternative. Renewable energy development would be closed or excluded from the ACEC.

OHV travel would be limited and livestock grazing would be open for all three alternatives. Alternatives B and C would designate the entire area as VRM Class II, and Alternative D would designate the entire area VRM Class III. Plant and rock collection would be closed in the area. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- increase erosion of highly erodible soils;
- introduce structures that disrupt scenic viewsheds; and
- introduce sediment to karst systems (thereby affecting karst function).

The entire area is limited or closed to mineral development, renewable energy, and OHV travel, fire suppression, and geophysical exploration. I of the restrictions, habitat for wildlife and special status plants and karst and soil resources would be protected from surface disturbance, thus reducing the potential for adverse effects to those resources. Compared to the No Action Alternative, management actions under these alternatives would help protect the scenic, wildlife, karst, special status plants, and soil resources within the Seven Rivers Hills ACEC. Therefore, these alternatives would preserve and provide the greatest protection to the relevant and important scenic, wildlife, karst, special status plants, and soil resources of the area.

Table 4-202. Mineral Leasing Options for the Seven Rivers Hills Area of Critical Environmental Concern by Alternative

Mineral Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	**1,027**	**1,027**	**1,027**	**1,027**	**1,027**
Leasable: open with standard terms and conditions	391 (38%)	148 (14%)	0/0	0/0	0/0
Leasable: open with moderate constraints (CSU)	0/0	0/0	0/0	0/0	0/0
Leasable: open with major constraints (NSO)	636/ (62%)	387 (38%)	1,027/ (100%)	1,027/(100%)	1,027/(100%)
Leasable: closed	0/0	492(48%)	0/0	0/0	0/0
Salable: open with standard terms and conditions	505 (49%)	535 (52%)	72/0	0/0	0/0
Salable: open with special terms and conditions(CSU)	0/0	0/0	0/0	0/0	0/0
Salable: avoid	0/0	0/0	0/0	0/0	0/0
Salable: closed	522 (51%)	492/ (48%)	1,027/ (100%)	1,027/ (100%)	1,027/ (100%)
Locatable: open with standard terms and conditions	505/ (49%)	535/ (52%)	0/0	0/0	0/0
Locatable: recommended for withdrawal	522/ (51%)	492/ (48%)	1,027/ (100%)	1,027/ (100%)	1,027/ (100%)

Table 4-203. Renewable Energy Leasing within the Seven Rivers Hills Area of Critical Environmental Concern by Alternative

Renewable Leasing Options on BLM-administered Lands (by acres)	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total acres	**954**	**954**	**954**	**954**	**954**
Geothermal: open	0	534 (52%)	72 (7%)	72 (7%)	72 (7%)
Geothermal: close	954 (100%)	492 (48%)	954 (93%)	955 (93%)	954 (93%)
Solar: variance	0	462 (48%)	0	0	0
Solar: exclude	954 (100%)	492 (52%)	954 (100%)	954 (100%)	954 (100%)
Wind: open	0	462 (48%)	0	0	0
Wind: avoid	954 (100%)	0	0	0	0
Wind: exclude	0	492 (52%)	954 (100%)	954 (100%)	954 (100%)

Six Shooter Canyon

The Six Shooter Canyon area contains important scenic, wildlife, geologic, and plant resources (see Section 3.4.1 for a more detailed description of the relevant and important values in this area). As a result, this area qualifies for management as an ACEC under Criterion 2 found at 43 CFR 1610.7-2 and BLM Manual 1613. Under Alternatives A and B, this area would be designated and managed as an ACEC to protect these values. However, under the No Action Alternative and Alternatives C and D, the area would be managed in accordance with the management direction provided for other resources and resource uses. Impacts to the Six Shooter Canyon area associated with the management direction provided under each of the alternatives are described below.

No Action Alternative

The No Action Alternative would not designate the Six Shooter Canyon area (735 acres) as an ACEC. For the No Action Alternative, 735 acres would be open to leasable, salable, and locatable minerals with standard terms and conditions. Geothermal and solar energy development would be closed and excluded within the entire area and wind energy development would be avoided within the area.

OHV limited travel would be designated on all 735 acres and livestock grazing would be open for all of the Six Shooter Canyon area under the No Action Alternative. The No Action Alternative would manage the entire Six Shooter Canyon area as VRM Class II. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- introduce structures that disrupt scenic viewsheds; and
- negatively impact or modify geologic formations.

I all of the area is open to mineral development and grazing, habitat for wildlife and special status plants, scenic viewsheds, and geologic formations would have little protection from surface disturbance, thus increasing the potential for adverse effects to those resources. Therefore, the No Action Alternative would provide the least protection to the relevant and important scenic, wildlife, geologic, and plant values of the area.

Alternatives A and B

Under Alternatives A and B, 735 acres would be designated as the Six Shooter Canyon ACEC and would be managed to protect scenic, wildlife, geologic, and plant resources. Under these alternatives, leasable, salable, and locatable minerals would be closed on 735 acres. ROW development would be excluded from the area, plant and rock collection would be prohibited, and the ACEC would be managed as closed and excluded from renewable energy development.

On 735 acres under Alternatives A and B, OHV limited travel and livestock grazing would be open for both alternatives. Under Alternatives A and B, the area would be managed as VRM Class II. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- introduce structures that disrupt scenic viewsheds; and
- negatively impact or modify geologic formations.

All of the area is closed to mineral development and renewable energy development, and limited to existing trails for OHV travel. I of these restrictions, habitat for wildlife and special status plants, scenic viewsheds, and geologic formations would have protection from surface disturbance. Compared to the No Action Alternative, management actions under these alternatives would help protect the scenic, wildlife, geologic, and plant resources within the Six Shooter Canyon ACEC. Therefore, Alternatives A and B would provide the greatest protection to the relevant and important values, and both alternatives would preserve the relevant and important values of the area.

Alternatives C and D

Alternatives C and D would not designate this area as the Six Shooter Canyon ACEC. Under these alternatives, leasable and salable minerals would be open with moderate constraints and conditions on 735 acres of BLM-administered surface lands. Locatable minerals would be open with standard terms and conditions. The area would be designated as an avoidance area for wind energy development. The area would be closed and excluded from geothermal and solar energy development.

On 735 acres under Alternatives C and D, OHV travel would be limited and livestock grazing would be open for both alternatives. Under both alternatives, the area would be managed as VRM Class II. Surface disturbance associated with resource development and use can introduce the following effects:

- negatively impact wildlife and plant habitat;
- introduce structures that disrupt scenic viewsheds; and
- negatively impact or modify geologic formations.

Compared to the No Action Alternative, Alternatives C and D would provide more protection to the relevant and important values of this area. However, because all of the area is available for mineral and renewable energy development, albeit with some constraints, habitat for wildlife and special status plants, and geologic formations would still have little protection from surface disturbance, thus increasing the potential for adverse effects to those resources. Therefore, these alternatives would provide little protection to the relevant and important scenic, wildlife, geologic, and plant values of the area. Scenic values would be somewhat protected by the VRM Class II prescription.

4.4.2 Wilderness Study Areas

4.4.2.1 Analysis Methods

4.4.2.1.1 Indicators

The Wilderness Act of 1964 established the National Wilderness Preservation System, which identified a system of federally owned areas designated by Congress as —wilderness areas. It mandated that these lands would be administered for the use and enjoyment of U.S. citizens in such a manner as to leave them unimpaired for future use and enjoyment. The goal of the Wilderness Act was to —secure for the American people of present and future generations the benefit of an enduring resource of wilderness.

Section 2(c) of the Wilderness Act identifies the wilderness characteristics used for evaluation of lands proposed for wilderness protections. The characteristics generally used to describe and evaluate effects to WSAs include the following.

- Size: The area must be at least 5,000 contiguous roadless acres, or be large enough to preserve as wilderness;
- Naturalness: The area must be in a generally natural condition;
- Opportunities for solitude and/or primitive recreation: The area must have outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Special features: The area may contain ecological, geologic, or other features of scientific, scenic, or historic value.

4.4.2.1.2 Methods and Assumptions

This analysis discloses the effects of management actions on the four wilderness characteristics listed above.

Size – The size of an area with wilderness characteristics is determined by roads, ROWs, or land ownership, but can also be determined by areas of unnaturalness. Impacts to the size requirement would be any types of development that directly affects the naturalness characteristics of the area. For this EIS, the types of development that affect size include linear features, such as pipelines, transmission lines, and roads. In all cases, the WSAs in the planning area are less than 5,000 acres in size, but are contiguous with non-BLM wilderness or WSAs.

Naturalness – Lands with wilderness characteristics must primarily be influenced by the forces of nature with evidence of humankind substantially unnoticeable. Evidence of humankind on the landscape affects the natural character of the area by introducing unnatural actions or objects. This can cause direct impacts to vegetation, wildlife, soils, landforms, water, and wetlands. The types of unnatural objects and actions that affect naturalness include pipelines, utility lines, roads, other structures, or any other ground disturbance (e.g., clearing of vegetation, digging, or grading of soil).

Opportunities for solitude and/or primitive recreation – Opportunities for solitude can be affected by management actions in two ways: whether a visitor can see the project action or hear the project action. In most cases, sound can affect wilderness characteristics for a much greater distance than visual effects noticeably affect characteristics. The presence and noise of people, vehicles, and equipment needed for mineral and renewable energy development, OHV travel, fire suppression, and geophysical exploration would impact opportunities for solitude and primitive recreation in WSAs. Depending upon the terrain, vegetation, atmospheric conditions, etc., outstanding opportunities for solitude and primitive recreation could be lost in a substantial portion or the whole of these areas during development and use. Opportunities for primitive recreation can be affected by management actions that confine primitive recreational use or the area, such as group size limits or designated camping areas.

Special features – Special features (or supplemental values) are those features identified as unique to the specific parcel. Most special features identified for areas with wilderness characteristics are items such as unique plants, wildlife, or geologic features, and are often analyzed in other sections of the EIS. Section 3.4.7 identifies any special features for WSAs in the CFO.

4.4.2.1.3 Direct and Indirect Impacts

Impacts of Actions on Wilderness Study Areas

As discussed in Section 3.4.7, currently, there are four WSAs within the CFO planning area:

- Devils Den (297 acres)
- Lonesome Ridge (3,702 acres)
- McKittrick Canyon (185 acres)
- Mudgett's (2,902 acres)

WSAs are managed under the BLM Manual 6330, Management of Wilderness Study Areas Manual, which directs the BLM to manage the areas so as not to impair their suitability for preservation as wilderness. This management policy applies to all uses and activities in WSAs, but the policy acknowledges there are uses specifically exempted from this standard by FLPMA, such as grandfathered uses and valid existing rights.

No Action Alternative and Alternatives A through D

Under the No Action Alternative and Alternatives A through D, the BLM is required to carry forward the protective standard outlined under BLM Manual 6330 (2012). These areas would be closed to mineral development and renewable energy development. All WSAs would be managed to maintain VRM Class I prescriptions; therefore, there would be no impacts to the wilderness characteristics of the WSAs from implementation of the No Action Alternative or Alternatives A through D.

The four WSAs in the planning area were not recommended for wilderness designation. This RMP does not alter the status of the four WSAs. If Congress accepts those recommendations and the WSA status is removed, for the No Action Alternative, the lands currently in the WSAs would be managed for multiple use under management prescribed in the Carlsbad RMP (BLM 1988) and the Carlsbad RMP Amendment (BLM 1997). Portions of the Mudgett's WSA and the Lonesome Ridge WSA would revert to management prescriptions under the Dark Canyon ACEC and the Lonesome Ridge ACEC, respectively. See Section 3.4.1 for more information on these ACECs.

Under the No Action Alternative, the Mudgett's WSA would be closed to leasable and salable minerals and withdrawn from locatable minerals. The other three WSAs would be open with major constraints for leasable minerals, closed for salable minerals, and withdrawn from locatable minerals. Renewable energy development would be excluded from all areas, ROWs would be avoided, OHV travel, fire suppression, and geophysical exploration would be limited to existing trails, and the areas would be managed for VRM Class II. I the area would be closed to surface disturbance and development from mineral or renewable energy development, Therefore, the No Action Alternative would still maintain wilderness qualities in the areas.

For Alternatives A through C, if Congress removes the WSA status, all four areas would be managed as closed to leasable, salable, and locatable minerals, renewable energy would be excluded from the areas, ROWs would be excluded from the area, and OHV travel would be limited to existing routes until a travel management plan were completed. For Alternatives A and B, the areas would be managed for VRM Class I and the areas would be managed for VRM Class II under Alternative C. These alternatives would retain many of the wilderness qualities present in the areas.

For Alternative D, if Congress removes the WSA status, all four areas would be managed as open with major constraints for leasable minerals, open with moderate constraints for salable minerals, and open for locatable minerals. Under Alternative D, renewable energy would be excluded from the areas, the areas would be managed for ROW avoidance, and OHV travel would be limited to existing routes until a travel management plan were completed. For Alternative D, the areas would be managed for VRM Class III. Removal of the WSA status would increase the likelihood of surface disturbance and development in the areas under this alternative, which would result in degradation of all wilderness qualities.

4.4.3 Wild and Scenic Rivers

4.4.3.1 Analysis Methods

4.4.3.1.1 Indicators

In this analysis, potential impacts to eligible WSRs are assessed qualitatively through the potential for development or management actions which would degrade or improve the outstandingly remarkable values, tentative classification, and free flowing status for which the eligible WSR is managed. For example, if a WSR is determined eligible because of the outstandingly remarkable fish and wildlife values, then any development or management actions within the WSR corridor that may disturb or affect habitat for fish and wildlife species would degrade those values. In addition, if any actions introduce development or structures (such as dams, pipelines, or other ROWs) along the river corridor, then the effects from those actions could change the river's classification (wild, scenic, or recreational) or free flowing status.

4.4.3.1.2 Methods and Assumptions

For the alternatives where eligible rivers would be determined suitable, the BLM would protect the outstandingly remarkable values, tentative classification, and free-flowing water of these rivers to the extent of its authority. The BLM's authority is limited to those portions of the segment where the BLM manages the shoreline or other lands within the corridor, and is subject to valid existing rights. The free-flowing character of eligible river segments would be protected to the extent that modifications such as stream impoundments or channelization would not be permitted along BLM shorelines. However, depending on the alternative, values may be at risk from potential mineral development, renewable energy development, OHV use, or other surface-disturbing activities. Unless public land is somehow involved in a proposed land use, the BLM has no control of potential modifications of the shoreline or other development (including development related to the perfection of water rights) on non-public lands.

4.4.3.1.3 Direct and Indirect Impacts

Impacts of Wild and Scenic Rivers Actions

As part of the RMP planning process, the BLM evaluated a number of river segments within the CFO planning area for eligibility as a WSR. Two river segments, one from the Black River (3.67 miles) and another the Delaware River (8.22 miles), were determined eligible. Appendix N – Wild and Scenic Rivers and Section 3.4.6 provides information on the eligibility and suitability of river segments for inclusion into the NWSRS.

No Action Alternative

Under the No Action Alternative, there are no river segments that have been designated as suitable for inclusion into the NWSRS. However, the segments would be managed as eligible until it is determined if they are suitable for designation in the ROD. Under the No Action Alternative, the Black river corridor would be open with major constraints for leasables, closed to salables and recommended for withdrawal for locatable mineral development. Renewable energy development would be excluded. ROWs would be avoided. OHV travel would be limited to existing routes and the corridor would be managed for VRM Class III.

The Delaware River segment would be open with major constraints to leasable development, closed to salable minerals and recommended for withdrawal from locatable development. Renewable energy development would be closed or excluded. ROWs would be avoided if possible. OHV travel would be open for 6.3 miles and limited to existing routes for 2.2 miles. Approximately 7.3 miles of the corridor would be managed for VRM Class II and 1.2 miles managed for VRM Class IV.

Surface disturbance caused by mineral development, renewable energy development, and OHV travel could affect the outstandingly remarkable values, free-flowing status, and tentative classification as follows:

- negatively impact fish and wildlife habitat;
- introduce structures that alter the river's free-flowing status;
- increase erosion of highly erodible soils;
- introduce structures that disrupt scenic viewsheds;
- negatively impact or modify geologic formations;
- introduce sediment to streams and karst systems (thereby affecting habitat and karst function); and
- negatively impact historical, cultural, and paleontological resources.

For both river segments under the No Action Alternative, because much of both river corridors would be closed to mineral development, renewable energy development, and OHV travel, this could decrease the potential for the above described effects. There would be more protection for fish and wildlife habitat; historical, cultural, and paleontological resources; and geologic formations from surface disturbance. Therefore, this alternative protects both river segments' outstandingly remarkable values, free-flowing status, and tentative classification at least until suitability determinations have been made in this RMP.

Alternative A

Alternative A would recommend both the Black and Delaware River segments as suitable for WSR designation. Under this alternative, the BLM would manage the eligible river segments to protect their outstandingly remarkable values, free-flowing water, and tentative classification to the extent of its authority as identified above, consistent with existing land use plan decisions and subject to valid existing rights. Note that the BLM does not own most of the mineral rights under either river. For both river segments, leasable, salable, and locatable minerals would be closed in the river corridor. Renewable energy development and ROWs would be excluded from the corridor. OHV travel would be limited to designated routes for the Black River segment and limited to existing trails for the Delaware River segment. Both river segments would be managed as VRM Class II.

I this alternative closes the river corridors to mineral and renewable energy development and limits OHV travel to designated routes or existing trails, the outstandingly remarkable values, free-flowing status, and tentative classification would be maintained. Thus, compared to the No Action Alternative, this alternative would provide slightly more protection to the outstandingly remarkable values, free-flowing status, and tentative classification identified for both eligible river segments.

Alternatives B, C, and D

Alternatives B, C, and D would recommend the Black River segment as suitable for WSR designation. Under these alternatives, the BLM would manage the eligible Black River segment to protect its outstandingly remarkable values including scenic resources and tentative classification to the extent of its authority as identified above, consistent with existing land use plan decisions and subject to valid existing rights. For the Black river segment under Alternatives B and C, leasable, salable, and locatable minerals would be closed in the river corridor. Under Alternative D, leasable minerals would be open with major constraints, salable minerals would be closed, and locatable minerals would be withdrawn. For all alternatives, renewable energy development and ROWs would be excluded from the corridor. OHV travel would be limited to designated routes and the river corridor would be managed as VRM Class II.

I these alternatives close the Black River corridor to mineral and renewable energy development and limits OHV travel to designated routes or existing trails, the outstandingly remarkable values, free-flowing status, and tentative classification would be maintained. Thus, compared to the No Action Alternative, these alternatives would provide slightly more protection to the outstandingly remarkable values, free-flowing status, and tentative classification identified for the eligible Black River segment.

Alternatives B, C, and D would not recommend the Delaware River segment as suitable for WSR designation. However, prescriptions from other special designations (such as the Carlsbad Chihuahuan Desert Rivers ACEC or the Gypsum Soils ACEC) would still afford protection to the river corridor, free-flowing water, and river values for Alternatives B and C. For example, surface disturbance restrictions in riparian zones and floodplains under these ACECs would protect river shoreline, riparian areas, and water quality.

For the Delaware River segment, BLM would be open to leasable and salable minerals with standard terms and conditions for 1.0 river miles. Approximately 7.5 miles of the river corridor would be open with major constraints to leasable minerals and closed to salable minerals. Locatable minerals would be open for 2.0 miles and recommended for withdrawal on 6.5 miles of the river corridor. Renewable energy development and ROWs would be avoided from the river corridor if possible. OHV travel would be limited to existing trails and the river corridor would be managed for VRM Class III.

Surface disturbance from mineral development, renewable energy development, and OHV travel could affect the outstandingly remarkable values, free-flowing status, and tentative classification in a number of ways. These alternatives would still allow varying degrees of construction, development, and use in the Delaware River corridor, including mineral development and renewable energy development. These actions would result in some level of surface disturbance and development that could alter fish and wildlife habitat; historical, cultural, and paleontological resources; the river's tentative classification; and free-flowing status. Thus, these alternatives would not provide protection to the outstandingly remarkable values, free-flowing status, and tentative classification identified for the eligible Delaware River segment.

Non-Designation

If Congress decides not to designate a suitable segment as part of the NWSRS, the protection management outlined in this section would no longer apply and these segments would be managed according to direction in other sections of the RMP. For all alternatives on the Black River, non-designation would increase surface disturbance within the river corridor, which would affect the river's outstandingly remarkable values. In addition, non-designation would increase potential for infrastructure across the river corridor, affecting its free-flowing status. The Delaware River would be protected by other special designations, such as the Carlsbad Chihuahuan Desert Rivers ACEC or the Gypsum Soils ACEC. These alternatives would still afford protection to the river corridor, free-flowing water, and outstandingly remarkable values. Alternative D would increase surface disturbance within the Delaware River corridor, which would affect the river's outstandingly remarkable values. In addition, non-designation would increase potential for infrastructure across the river corridor.

4.4.4 Backcountry Byways

4.4.4.1 Analysis Methods

4.4.4.1.1 Indicators, Methods, and Assumptions

In this analysis, potential impacts to backcountry byways are assessed qualitatively through the potential for development or management actions which would degrade or improve the scenic and recreation values of the road corridor. For example, development or management actions could introduce structures or unnatural modifications on the landscape. These actions would alter recreation sightseeing or the viewshed of the road corridor, affecting its scenic and recreational sightseeing quality.

4.4.4.2 Direct and Indirect Impacts

4.4.4.2.1 Impacts of Actions on Backcountry Byways

Additional BLM Backcountry Byways and National Recreation Trails may be designated in the future as deemed appropriate with site-specific environmental analysis

4.4.4.2.2 Guadalupe Backcountry Byway

No Action Alternative and Alternatives A through D

For all alternatives (No Action and Alternatives A–D), the CFO would continue designation of 55 miles of NM 137 as the Guadalupe Backcountry Byway. The No Action Alternative would continue to manage the Guadalupe Backcountry Byway as prescribed in the 1995 Byway Plan (BLM 1995). The 1995 Byway Plan incorporates a number of operating procedures for construction of power lines and pipelines along the byway, including guidelines to minimize visibility of infrastructure. These include requirements to use colors that match the surrounding landscape, blading only the minimum amount of the ROW for pipeline burial, and removing vegetation using an irregular contour to minimize stark contrasts in vegetative cover.

Alternatives A through C would also manage the Guadalupe Backcountry Byway as prescribed in the 1995 Byway Plan. These alternatives would maintain scenic quality and improve recreational experiences for Guadalupe Backcountry Byway travelers. Additional signage and interpretation under these alternatives would increase education of byway features and travelers would be provided with quality recreational sightseeing along the byway.

Alternative D would incorporate the same prescriptions and goals and objectives for the Guadalupe Backcountry Byway, except that BLM-administered lands within 1 mile of the roadway would be managed to maintain VRM Class III. Scenic values for the Backcountry Byway would be degraded when compared to the No Action Alternative or Alternatives A through C. However, scenic and recreation values would still be maintained along the Backcountry Byway and travelers would still be provided with quality recreational sightseeing along the byway.

4.4.4.2.3 Dark Canyon Backcountry Byway

No Action Alternative

Under the No Action Alternative, the Dark Canyon Loop Road would not be designated as a BLM Backcountry Byway, but would instead be managed as the part of the Dark Canyon SMA, including the Dark Canyon ACEC and the Dark Canyon Scenic Area. Approximately 3,220 acres would be managed as VRM Class II and 730 acres managed as VRM Class III.

Alternatives A and B

Under Alternatives A and B, 9.5 miles of the Dark Canyon Road loop would be designated as a BLM Backcountry Byway and would be managed with the same prescriptions as the Guadalupe Backcountry Byway. Leasable minerals would be managed as open subject to moderate constraints. BLM-administered lands would be managed as VRM Class II within a 1-mile buffer from either side of the road. Alternatives A and B would maintain scenic quality and recreational experiences for Dark Canyon Backcountry Byway travelers. Restrictions on mineral and renewable energy leasing, OHV restrictions, and the 1-mile VRM Class II buffer would maintain the scenic quality along the route. Designation of the route as a Backcountry Byway under these alternatives would increase education of scenic and recreation features and travelers would be provided with quality recreational sightseeing along the byway.

Alternatives C and D

Alternative C would not designate the Dark Canyon Road loop as a BLM Backcountry Byway. Instead, the area would be managed with the same prescriptions as the Guadalupe Backcountry Byway. BLM-administered lands would be managed as VRM Class II within a 0.5-mile buffer from either side of the road. Despite not designating the route as a Backcountry Byway, Alternative C would maintain scenic quality and recreational experiences for route travelers. Restrictions on mineral and renewable energy leasing, OHV restrictions, and the 0.5-mile VRM Class II buffer would maintain the scenic quality and would provide quality recreational sightseeing along the route.

Alternative D would not designate the Dark Canyon Road loop as a BLM Backcountry Byway. Instead, the area would be managed with the same prescriptions as the Guadalupe Backcountry Byway. BLM-administered lands would be managed as VRM Class III within a 1-mile buffer from either side of the road. Scenic values for the route would be degraded when compared to the No Action Alternative or Alternatives A through C. There are few restrictions on mineral leasing, and the 0.5-mile VRM Class III buffer would not maintain the scenic quality and travelers would have reduced recreational sightseeing experiences along the route.

4.5 SOCIAL AND ECONOMIC

4.5.1 Tribal Rights and Interests

This section summarizes the impacts to tribal rights and interests from management actions discussed in Chapter 2. Existing conditions concerning tribal rights and interests across the planning area, as they are known, are described in Chapter 3 (see Section 3.5.1).

Management decisions that result in the degradation or removal of access to lands with tribal significance, including sacred site and TCPs, are considered adverse to tribal rights and interests. Degradation can include the disturbance of native land conditions considered significant to tribes, which can reduce the amount of land on which tribes can exercise their rights to hunt, gather, fish, and conduct ceremonies on federal land. Native plant communities, wildlife habitats, and cultural resource sites are more likely to be impacted from surface disturbance compared to areas left undisturbed. Actions that conserve or restore those lands considered significant to tribes, such as the protection of high-value wildlife habitat and native vegetation restoration programs, are considered beneficial to tribal rights and interests. This is because the native conditions of lands with tribal significance are more likely to be maintained or restored compared to those management decisions that allow surface disturbance to occur.

Prior to implementing management decisions with potential effects to places of traditional religious and cultural importance to tribes, the BLM CFO would comply with the following:

- NHPA
- Native American Graves Protection and Repatriation Act
- Executive Memorandum of April 29, 1994, on Government-to-Government Relations with Native American Tribal Governments
- EO 13007 Regarding Indian Sacred Sites
- EO 13175 Consultation and Coordination with Indian Tribal Governments

Government-to-government consultation would occur prior to implementing projects that follow the management actions considered in the RMP. Implementation level planning would address potential impacts to tribal rights and interests at the project level.

4.5.1.1 Summary of Potential Impacts to Tribal Rights and Interests

The BLM CFO has limited information about the specific areas of significance to tribes, including locations of TCPs and sacred sites, in the planning area. Section 3.5.1, Tribal Rights and Interests, identifies several types of TCPs and their associated resources of recognition that could be valued by tribes with interest in the planning area. Furthermore, the *Ethnographic and Archaeological Inventory with the Mescalero Apache Tribe of Potential Traditional Cultural Properties within the Vicinity of the Permian Basin MOA* (Brown et al. 2010) and the *Class I Overview of Cultural Resources within the Bureau of Land Management's Carlsbad Field Office Region* (Railey 2012) provide insights into geographic features and resources with potential significance to tribes.

Based on this information, three indicators have been identified to assist the reader in understanding potential impacts to tribal rights and interests from management decisions considered in this RMP. These indicators are management decisions associated with cultural resources, acres of BLM-administered land identified for disposal, and management decisions associated with riparian resources. However, not all impacts to cultural resources and riparian areas, nor all land tenure decisions, directly result in impacts to tribal rights and interests because not all BLM-administered lands hold tribal significance.

Cultural resource sites can be affiliated with prehistoric occupations that are significant to Native American tribes with interest in the planning area today. The impacts from allocations and management actions identified for cultural resources would also apply to tribal rights and interests if a particular archaeological site holds tribal significance. Management decisions that allow surface disturbance, increased noise levels, and cause visual resource impacts, such as constructing infrastructure within viewing distance of a significant site,

to cultural resources with significance to tribes would impede the ability of Native Americans to use areas associated with these cultural resources. Although a significant site many not be directly impacted by nearby surface disturbance, indirect impacts, such as noise intrusion and visual resource impairment, could introduce elements that alter the local setting, thereby reducing the integrity of the site (NPS 1998). Further, unlike sites of purely archaeological or historical interest, impacts to TCPs and sacred sites may not be suitably mitigated through the recovery of scientific information because the significance of a site may be intangible or have supernatural connotations (NPS 1998). Instead, resolution of adverse effects would need to occur during project-specific tribal consultation activities, in accordance with Section 106 of NHPA and EO 13007 (Advisory Council on Historic Preservation [ACHP] 2012). Section 106 of the NHPA requires federal agencies to take into account the effects of an undertaking on historic properties, which could include properties of traditional religious and cultural significance to tribes. EO 13007, "requires Federal land managing agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites" (ACHP 2013). For a detailed discussion of impacts to cultural resources from implementing the alternatives, see Section 4.1.6.5.

Decisions made by the BLM to dispose of land could have an adverse impact to tribal rights and interests, by reducing the amount of public land available for tribal access to exercise rights and interests, such as ceremonies, hunting, plant gathering, etc. Adverse impacts to tribal rights and interests are most likely to occur when the land is located near, provides access to, or contains a TCP and is transferred to private ownership where access to non-owners is typically restricted. The presence of TCPs has not been identified for those lands considered for disposal in this RMP. However, the locations of all TCPs within the planning area are not known by the BLM CFO. All lands identified for disposal would undergo a cultural resource investigation and government-to-government consultation prior to approval of the disposal action, which could lead to the identification of a TCP. If a TCP is identified on lands identified for disposal, the discovery could lead to cancellation of the transaction or resolution of adverse effects resulting from the disposal action, in accordance with Section 106 of NHPA and EO 13007. Not all lands identified for disposal would have an adverse impact on tribal rights and interests. For example, those BLM-administered lands within Carlsbad Caverns National Park, if made available for exchange with the NPS, would remain under federal management. Therefore, tribal access would be maintained per EO 13007. Additionally, the disposal of lands with no associated tribal interests (TCPs or sacred sites) would not impact tribal rights. For a detailed discussion of impacts to cultural resources from implementing the land tenure alternatives, see Section 4.3.7, Land Tenure.

Native riparian plant communities can sustain valuable plant and animal species sought in hunting, gathering, and ceremonial activities. The *Ethnographic and Archaeological Inventory with the Mescalero Apache Tribe of Potential Traditional Cultural Properties within the Vicinity of the Permian Basin MOA* (Brown et al. 2010) identifies several TCPs important to the Mescalero Apache Tribe located near riparian areas in the planning area. Management decisions that emphasize the protection or restoration of riparian areas through such actions as placing surface disturbance buffers around springs and seeps and managing mineral allocations within riparian areas as closed or open with constraints, would have beneficial impacts to tribal rights and interests because native riparian vegetation would be more likely to occur in the protected areas. In addition, riparian areas can provide favorable habitat for tribally important animals (e.g., bald eagles, elk, and mule deer) and may be geographic features desired for ceremonies. Management decisions that allow surface disturbance to occur within riparian areas would have adverse impacts to tribal rights and interests if those areas open to disturbance contained TCPs or other significance to tribes (such as species of importance). For a detailed discussion of impacts to riparian areas from implementing the alternatives, see Section 4.2.3.2, Riparian Resources.

Impacts resulting from wildland fire management, mineral development, land use authorizations, livestock grazing, noxious weeds, recreation, renewable energy, soils, travel management, water resources, lands with wilderness characteristics, vegetation, VRM, wildlife, and special designations are not included in this analysis because the resulting impacts from these resources and resource uses are captured in the analysis for the indicators described above.

Impacts resulting from management decisions for air resources, backcountry byways, karst resources, public health and safety, and paleontological resources are not anticipated to impact tribal rights and interests based on the limited information provided by tribes with interest in the planning area.

4.5.2 Social and Economic Conditions

This section describes the potential effects on social and economic conditions from the implementation of the proposed BLM CFO management alternatives.

As described in Chapter 3, the social and economic study area (SESA) was defined to include all of Chaves, Eddy, and Lea Counties to capture the potential impacts of proposed BLM CFO management decisions on communities in and around the planning area (see Figure 3.5-1). The CFO planning area includes lands in all of Eddy and Lea Counties and a portion in Chaves County.

4.5.2.1 Analysis Methods

This section identifies the quantitative and qualitative indicators used in the analysis to evaluate changes in social and economic conditions, and presents the methods and key assumptions used in the analysis.

4.5.2.1.1 Indicators

The following indicators were used to assess economic effects of the alternatives:

- Direct output, employment, and labor earnings from economic activities in the CFO planning area affected by the alternatives. Throughout this section, all dollar values are reported in constant, 2014 dollars and do not include any effects from future inflation. Employment is reported in terms of combined numbers of annual full- and part-time jobs.
- Secondary output, employment, and labor earnings throughout the SESA resulting from economic activities in the CFO planning area affected by the alternatives (also known as “multiplier” effects)
- Tax revenues to state and local governments resulting from direct and secondary economic effects of the alternatives
- Non-market values associated with lands in the CFO planning area, including economic benefits to recreationists, ecosystem services, and passive or existence values. Changes in these values were evaluated in qualitative terms.

The following indicators were used to assess social effects of the alternatives:

- Potential changes in the number of residents in the SESA resulting from economic effects.
- Potential changes in the number of households in the SESA and corresponding demand for housing.
- Potential changes in the number of school-aged children in the SESA and corresponding demand for public education.
- Potential effects from the perspective of varied communities of interest (ranchers, recreationists, individuals who prioritize resource use, and individuals who prioritize resource protection). These effects were qualitatively assessed.

Environmental justice was assessed based on whether disadvantaged or minority populations identified in Chapter 3 would suffer disproportionate adverse effects from any of the alternatives.

4.5.2.1.2 Methods and Assumptions

Economic models were developed to estimate the direct output, employment, and labor earnings associated with oil and gas development, potash mining, and grazing activity. These models and other assumptions used in the economic and social effects analysis are described below.

Economic Models

A model was developed to estimate the direct output, employment and labor income effects associated with new well development (exploration, drilling and completion), and with the ongoing support and maintenance of wells after they are put into production.

Direct effects of oil and gas activity on SESA employment and other economic metrics were projected based on the combination of the number of new wells drilled in each year and the number of existing wells in active production during the year. This approach is consistent with the methodology used in numerous prior environmental impact studies for BLM RMPs involving substantial oil and gas activity[3] and in other studies of the oil and gas industry.[4]

The oil and gas direct economic effects model was initially calibrated based on statewide data on the number of wells completed and operating in New Mexico from 2007 through 2011 (New Mexico Energy, Minerals, and Natural Resources Department [EMNRD] 2012) and the number of statewide employees in the sectors of oil and gas extraction, oil and gas support activities, and drilling oil and gas wells (Bureau of Labor Statistics 2013). The statewide model was then adjusted to fit data from the SESA based on the number of wells completed and operating on federal lands (BLM 2011a), the estimate that federal lands account for 40% of oil and gas wells in the study area (RFD), and economic data for the oil and gas sectors in the SESA (IMPLAN 2011).

Based on the analysis just described, the annualized direct employment associated with oil and gas activity in the SESA was estimated at 3.7 jobs per new well drilled each year (in drilling and support activities) and 0.31 jobs per existing well active in the study area (in extraction and support activities). While these ratios may appear low relative to the comparatively large number of workers typically involved during the drilling of new wells, it should be recognized that these are annualized employment figures—while the period of time associated with drilling an individual well is typically much shorter than a full year. These figures also exclude indirect impacts on other industries such as subcontractors in construction-type industries. Indirect jobs are accounted for through analysis using the IMPLAN regional input-output model, described later in this section. Overall, applying these ratios from the oil and gas direct economic effects model to the estimated number of wells completed and active in 2010 indicates a direct oil and gas workforce of nearly 14,000 workers in 2010, which is consistent with baseline economic data from these sectors from the IMPLAN model for that year.

A model was also developed to estimate the direct output, employment, and labor income effects associated with grazing lands. The economic value of grazing lands was modeled by estimating the annual market value resulting from the grazing that occurs on federal lands. The total amount of grazing is represented by the number of AUMs actually used (billed use) on CFO lands by area ranchers. The corresponding value per AUM was calculated based on inventory and sales data from the 2007 Census of Agriculture. As discussed in a previous section, it was assumed that beef cattle represented the most significant source of demand for grazing lands. Therefore, the total inventory in the three-county SESA was 192,999 beef cattle and calves or about 1.2 million AUMs.[5] The inflation adjusted 2014 value of this inventory was approximately $483 per head or $81 per AUM.[6]

These results were used in conjunction with the IMPLAN input-output model to estimate the employment and labor income effects. Current grazing permits on federal lands allow 367,656 AUMs. The maximum number of AUMs actually used (billed) from 2000 through 2010 was 267,902 in 2009. Based on the IMPLAN model developed for this study, the maximum historical billed use supported an estimated total of 137 jobs, including secondary employment effects discussed below. I of the prevalence of private grazing lands within the SESA, federally owned grazing lands only represent a portion, and not the entirety, of the local grazing economy.

[3] See for example the White River Field Office RMP Amendment EIS (BLM 2012), Lander Draft RMP EIS (BLM 2011b), the Kemmerer Proposed RMP EIS (BLM 2008c) and the Casper Draft RMP EIS (BLM 2007c).
[4] See for example *Assessment of Oil and Gas Industry, 2012 Industry Economic and Fiscal Contributions in Colorado*, Business Research Division, University of Colorado, 2012; and *Wyoming Oil and Gas Economic Contribution Study*, Booz/Allen/Hamilton, 2008.
[5] The estimated number of AUMs was derived based on the total number of cattle and calves, divided by two to represent cow/calf pairs and multiplied by 12 to convert to total animal unit months over a full year.
[6] Because Chaves County cattle sales data were suppressed in the 2007 Census of Agriculture, the value per AUM was based on the total value of cattle sales in Eddy and Lea Counties in 2007, divided by the total AUMs in those two counties, then updated for inflation from 2007 dollars to 2014 dollars using the national consumer price index.

Direct jobs in oil and gas, agriculture, recreation, and other activities supported by the federal lands administered by the CFO produce additional economic activity in the study area as directly affected businesses purchase goods and services from other firms, and as the employees of these businesses purchase household goods and services. These additional rounds of local spending are often referred to by economists as indirect and induced effects (and by others as "multiplier effects"). To avoid confusion with NEPA terminology regarding indirect effects, these effects are referred to in this analysis as "secondary" economic effects.

Secondary economic effects from activities supported (at least in part) by BLM-administered lands, and potentially affected by the management alternatives, were estimated using the IMPLAN regional input-output model. IMPLAN is an input/output modeling system originally developed for the USFS and is widely used by both private- and public-sector economists for impact analyses throughout the United States. For consistency with the description of existing economic conditions provided in Chapter 3 (which was developed in 2011–2012), the IMPLAN model incorporated 2010 data for the SESA.

Additional Assumptions

Other assumptions used in the economic models and other portions of the economic and social effects analysis are described below:

- The potential number of wells completed in each year is based on the total number of wells projected to be developed under each alternative, divided by the 20 years in the planning period for this RMP.
- Development of ancillary oil and gas facilities (e.g., pipelines, compressor stations, gas plants) is assumed to be proportional to number of wells developed.
- Projected economic effects from oil and gas development are based on the potential number of wells completed each year under each alternative and the modeling approach described previously. The actual number of wells developed will be influenced by market conditions. It may also be affected by BLM management actions under the alternatives that would affect the cost and complexity of oil and gas development. These management actions are discussed in the economic analysis, but their effects on actual oil and gas development cannot be quantified. However, the relative effects from these actions across the four action alternatives (and the No Action Alternative) generally mirror the relative number of wells projected to be developed under each alternative based on land use limitations and stipulations.
- Projected economic effects from other mineral-related activities are based on assumptions regarding future mineral activity, and the effects of the management alternatives on that activity. These assumptions are described in Section 4.3.1.1, Solid Leasable Minerals; Section 4.3.1.2, Locatable Minerals; and Section 4.3.1.3, Salable Minerals. Section 4.3.1.1 concluded that a total of two new mines would be added to the three operating potash mines and the recently permitted mine by the end of the 20-year planning period. New mines were assumed to be comparable in size (employment and output) to the existing mines. The projected economic effects from these projected new operations reflect impacts from operations and do not include short-term economic effects from construction of new mines.
- Projected billed AUMs under each alternative are used to calculate the potential economic value of grazing lands based on the model described previously. The large difference between the number of available (or potential) AUMs on CFO lands, and the number of AUMs actually used (billed use), somewhat complicates this analysis. Under several of the management alternatives, the number of permitted AUMs would be considerably less than the number permitted under existing conditions, but still more than the number of AUMs that have been actually used historically. Consequently, the study team estimated a range of potential grazing impacts under two alternative perspectives. The "minimum effect" estimate assumed that ranchers would be able to move their cattle to different locations, if necessary, to take advantage of any available (permitted) AUMs. The "maximum effect" estimate assumed that the historical slack in the system (represented by the difference between permitted AUMs and actual use) reflects, at least in part, geographic limitations on where ranchers can utilize available AUMs. For this estimate, billed use was assumed to decline in proportion to any reduction in permitted AUMs relative to existing conditions.

- For purposes of the economic analysis, the value per AUM was based on cattle grazing. As described in Chapter 3, cattle comprise about 90% of all animals grazed on lands managed by the CFO.
- The USFS and BLM define an AUM as a cow-calf pair. To calculate AUMs, the Census of Agriculture inventory of beef cattle, including calves was divided by two to account for cow-calf pairs. Dairy cattle were excluded from the analysis.
- Due to privacy disclosure restrictions, the Census of Agriculture did not report complete cattle sales data for Chaves County. Therefore, data from this county were not used in estimating the average value per AUM.
- The assessment of effects on the recreation-related economy is based primarily on the evaluation of recreation effects from the management alternatives (see Section 4.3.6). Management alternatives deemed in that evaluation to have positive effects on recreation, recreation opportunities, the recreation experience, or recreation satisfaction would generally have positive effects on the recreation-related economy. This reflects the assumptions that satisfied recreational users would be more likely to return to the area in the future and/or new recreational visitors may be attracted to the area based on positive referrals from satisfied users.
- Current employment effects from recreation on BLM-managed lands were based on annual visitation estimates and previous estimates of the employment effects of recreation on BLM-administered lands in New Mexico, described in Chapter 3. It was not, however, possible to quantify differences in future visitation levels (and corresponding economic effects) among the alternatives. Most recreational users in the CFO are local residents, and overall visitation is expected to continue to increase under any of the alternatives due to future population growth (BLM 2014b).
- Fiscal effects on state and local and federal tax revenues for each alternative were based on the IMPLAN modeling's tax impact results for that alternative. Tax revenue estimates from IMPLAN are industry and location-specific, but the specific allocation of these revenues among their sources is generic. In general, industry-related tax revenues include indirect business taxes such as sales taxes, property taxes, severance taxes and royalties, corporate profits taxes and personal income and social insurance taxes, among other sources (IMPLAN 2015). I the economic effects from recreation were estimated based on the CFO's share of statewide recreation on BLM-administered lands, estimates of the fiscal effects of recreation on state, local, and federal tax revenues were not available.
- For purposes of estimating demographic impacts, and potential effects on demands for housing and other public services, this analysis uses a set of ratios based on information from the 2010 Census for the SESA. Each new job is assumed to result in an additional 1.9 residents living in the study area. There are assumed to be 2.8 residents per household in the study area for purposes of estimating housing demand corresponding to the economic and demographic projections. Finally, 20% of all new residents are assumed to be school-age children (U.S. Census Bureau 2010). The demographics of the oil and gas workforce, and the potash mining workforce, may differ from these averages, but no specific data is available regarding industry-specific demographic characteristics.

4.5.2.2 Economic Direct and Indirect Impacts

This section focuses on five categories of potential economic effects, including actions affecting

- oil and gas–related economic activity,
- other mineral-related economic activity,
- agricultural economic activity,
- recreation-related economic activity, and
- non-market economic values.

Within each of these categories, the assessment initially focuses on impacts from management actions common to all alternatives, and then describes impacts from management actions common to all action alternatives. Distinguishing aspects of the management strategies under each of the five potential management alternatives (No Action and Alternatives A–D) are then evaluated.

This section concludes with a summary of the projected direct and indirect economic effects for each of the alternatives.

4.5.2.2.1 Actions Affecting Oil and Gas-related Economic Activity

As described in Chapter 3, the mining sector (which includes oil and gas activity in standard economic classification systems, such as the North American Industry Classification System) supports the most jobs in two of the three counties (Eddy and Lea Counties) that comprise the SESA. Although the mining sector includes potash mining, caliche mining, and other important mineral activities, from an economic standpoint it is dominated by oil and gas-related activities, which account for the large majority of mining-related output, value-added, and employment. This initial portion of the economic direct and indirect effects assessment focuses on oil and gas-related economic activity. Other economic activity related to minerals is assessed in the following section.

Proposed BLM management actions in several categories may impact future oil and gas development by either increasing or decreasing the cost and complexity of oil and gas development and production or by limiting or otherwise restricting the areas open to new oil and gas leases.

Impacts from Management Common to All

Proposed BLM management actions common to all alternatives related to oil and gas development generally continue existing practices intended to facilitate oil and gas development while minimizing impacts on resources and other resource uses. Management actions common to all alternatives in the following categories are particularly relevant to future oil and gas development (and the oil and gas-related economy). These actions are consistent with the BLM's existing practices and would have no economic effect relative to current conditions.

Special Designations – Wilderness Study Areas

WSAs would be closed to leasing (unless and until they may be determined to not be designated as wilderness areas) and existing leases would not be reissued when they expire. While these management actions common to all alternatives represent a continuation of current practices, the various alternatives involve different sets of potential WSAs to which these management actions would be applied. Alternative-specific differences in management alternatives are discussed later.

Visual Resource Management

Oil and gas development in leased areas with scenic quality is expected to be planned to maintain visual resource quality by using utility corridors to accommodate pipelines, power lines, access roads, and other necessary infrastructure.

Impacts from Management Common to All Action Alternatives

In addition to the management actions common to all alternatives (which include the No Action Alternative), there are also management actions that would be common to all action alternatives, but would not be in effect under the No Action Alternative. Management actions common to all action alternatives in the following categories are particularly relevant to future oil and gas development (and the oil and gas-related economy).

Air Resources

All new and existing drill rig, completion rig, work-over rig, and fracturing pump engines would be required to meet EPA Tier 4 Standards for Nonroad Diesel Emissions within 1 year of the ROD. This management action common to all action alternatives could impose additional costs on some existing wells by requiring them to retrofit with newer engines.

Impacts from the No Action Alternative

Under the No Action Alternative, the BLM would continue to manage oil and gas development on federal lands in the same manner that it does at present. BLM management actions would not change the cost or complexity of oil and gas operations on BLM-administered lands, the amount of BLM-administered land open to oil and gas leasing, or the stipulations and conditions for oil and gas development on available lands.

Projected Direct/Indirect Oil and Gas-related Economic Effects of the No Action Alternative

At present (2017), there are approximately 16,400 active wells on lands managed by the CFO and split estate lands, out of a total of about 32,000 active wells located within the SESA. Under the No Action Alternative, 5,874 new wells are projected to be drilled on BLM-administered lands over the 20-year period of analysis for this RMP, or an average of about 294 new wells per year.

Some of the 16,400 existing wells administered by BLM will be retired (plugged) during the 20-year period of analysis. Based on historical data from the past decade, an average of 255 wells on BLM-administered lands is projected to be retired from production each year (BLM 2014b).

Since the annual rate of new well development is projected to be larger than the annual rate of existing well retirement, the total number of active wells on BLM-administered lands is projected to increase over the planning period. By the 20th and final year of the planning period, there are projected to be over 17,100 active wells on BLM-administered and split estate lands.

As discussed in Analysis Methods information earlier in this section, the economic effects from oil and gas-related activity were estimated based on an economic model derived from statewide information on New Mexico oil and gas activity and employment, which was calibrated for the SESA based on local data for year 2010. Annual direct employment, labor earnings, and regional output in oil and gas sectors was projected based on the number of new wells drilled in each year and the number of existing, active wells (which require operations and maintenance). Secondary jobs in other sectors supported by purchasing from oil and gas-related businesses, and their employees, were estimated using the IMPLAN model.

In 2017, oil and gas activity on BLM-administered and split estate lands directly and indirectly supports nearly 10,800 jobs in the SESA (out of a total number of approximately 22,300 jobs supported by oil and gas activity in the SESA, including jobs related to wells on State and private lands). Direct oil and gas jobs include jobs in the following sectors, as defined by IMPLAN: drilling oil and gas wells, oil and gas extraction (maintenance), and support activities (which can be related to either drilling or maintenance of existing wells). Based on the proportions of employment in these oil and gas subsectors, and historical fluctuations in employment relative to the number of wells completed in each year, approximately 20% to 25% of direct and indirect oil and gas employment in the SESA is related to current drilling activity, while the remaining 75% to 80% of oil and gas employment is related to overall production from the area and maintaining existing wells. Under the No Action Alternative, the number of jobs directly and indirectly supported by oil and gas activity on BLM-administered lands is projected to increase over the 20-year planning period due to the increase in the total number of active wells described previously. By the end of the planning period, oil and gas activity on BLM-administered and split estate lands is projected to directly and indirectly support about 11,200 jobs.

Further detail regarding the projected economic effects of oil and gas activity on lands managed by the BLM under the No Action Alternative is provided in Table 4-204. By the end of the planning period (year 20), total employment (direct and indirect) related to oil and gas activity on BLM-administered lands is projected to increase by about 400 jobs under the No Action Alternative. Annual labor earnings are projected to increase by $33 million and annual regional economic output related to oil and gas activity on BLM-administered lands is projected to increase by $88 million.

It is important to recognize that projections of future oil and gas activity, and corresponding regional economic activity, are inherently uncertain. The data provided in the effects tables in this section are based on the simplifying assumption that the annual numbers of new wells will be constant throughout the 20-year study period, with the number of new wells in each year being 1/20th of the total number of wells projected to be drilled over the 20-year period. In reality, of course, the pace of drilling activity would likely rise and fall from year to year, depending on external factors including the demand and price for oil and gas resources. History suggests there would likely be periods of relative “boom” and periods of relative “bust” during the 20-year study horizon.

Table 4-204. Projected Direct/Indirect Economic Effects from Oil and Gas Activity on BLM-administered Lands under the No Action Alternative

Direct/Indirect Effects	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Number of acres available for leasing*	2,555,280	2,555,280	0	0
Annual number of wells drilled	294	294	0	0
Total active wells	16,774	17,162	388	777
Drilling-related jobs†	1,851	1,851	0	0
Maintenance-related jobs†	9,140	9,352	212	424
Total jobs†	10,991	11,203	212	424
Total labor earnings† (millions of 2014 dollars)	$817	$833	$17	$33
Total regional output† (millions of 2014 dollars)	$2,283	$2,327	$44	$88

* Open with standard terms and conditions or open with moderate constraints (CSU).
† Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative A

Specific management actions and requirements under Alternative A would likely increase the complexity and cost of oil and gas development. The following are examples of these types of management actions and requirements.

Actions Affecting Cost and Complexity of Oil and Gas Operations

Air Resources

Alternative A would require VRUs for all new wells and production facilities. Dust suppression would be required for construction areas and roads. Emission controls to limit VOCs would be required for tanks and dehydrators. At least 70% of gas compressors and well head pumps would need to be powered by electricity.

The effects of these types of actions and requirements could affect the financial viability of some future oil and gas developments, particularly during periods when oil and gas prices are low. Based on the more detailed assessment of these actions and requirements in Section 4.3.1.1 (Fluid Leasable Minerals), their effects are likely minor in comparison to the effects of excluding additional lands from oil and gas development, or imposing additional restrictions on surface use, under Alternative A. Quantitative estimates of impacts on oil and gas development in Section 4.3.1.1 are based entirely on the projected changes in the amount of land available for oil and gas development, and the conditions that would be imposed for oil and gas development on those lands.

Actions Affecting Land Available to Oil and Gas Development and Potential Number of Wells Developed

Measurable effects of land exclusions and restrictions on oil and gas development, and the associated regional economic impacts, can be estimated since they directly relate to access to federal minerals. In contrast, quantifying the impacts associated with actions affecting cost and complexity of oil and gas development is less straightforward because the decision to pursue development remains largely on proponents' evaluations of the financial viability of development which is function of various other factors. Alternative A would exclude or substantially restrict more land from oil and gas development than the No Action Alternative. Under Alternative A, approximately 1,942,451 acres of BLM-administered and split estate land would be open to oil and gas leasing with standard lease terms and conditions or with moderate constraints such as CSU. This is approximately 24% fewer acres than under the No Action Alternative. The number of future wells that would be developed is assumed to be reduced by the same proportion.

Projected Direct/Indirect Oil and Gas-related Economic Effects of Alternative A

Under Alternative A, 1,409 fewer new wells on BLM-administered lands are projected to be developed over the 20-year planning period than under the No Action Alternative. Correspondingly fewer jobs would be directly and indirectly supported by oil and gas activity on BLM-administered lands. Table 4-205 summarizes the projected differences between oil and gas-related economic activity under Alternative A, relative to the No Action Alternative. To help place these effects estimates in context, the table also shows estimated current (2017) values for each metric. By year 10 of the planning period, oil and gas-related activity on BLM-administered lands is projected to support about 790 fewer jobs in the SESA than under the No Action Alternative, along with about $54 million less in annual labor earnings and $164 million less in annual regional economic output. These differences increase by year 20, when Alternative A is projected to support 1,175 fewer jobs related to oil and gas activity on BLM-administered lands than the No Action Alternative.

The economic estimates just described are relative to the projections under the No Action Alternative, which anticipate ongoing growth in oil and gas-related employment and other economic measures over the 20-year planning period. Relative to current conditions (2017), Alternative A is projected to support fewer oil and gas-related jobs throughout the planning period.

Table 4-205. Projected Direct/Indirect Economic Effects from Oil and Gas Activity on BLM-administered Lands under Alternative A

Direct/Indirect Effects	Projections for Alternative A		Projected Differences Between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Number of acres available for leasing*	1,942,451	1,942,451	-612,829	-612,829	-612,829	-612,829
Annual number of wells drilled	223	223	-71	-71	-71	-71
Total active wells	16,069	15,817	-316	-568	-704	-1,345
Drilling-related jobs†	1,407	1,407	-444	-444	-444	-444
Maintenance-related jobs†	8,793	8,621	-134	-307	-346	-731
Total jobs†	10,200	10,028	-578	-751	-790	-1,175
Total labor earnings† (millions of 2014 dollars)	$763	$750	-$38	-$51	-$54	-$83
Total regional output† (millions of 2014 dollars)	$2,119	$2,083	-$119	$155	-$164	-$244

* Open with standard terms and conditions or open with moderate constraints (CSU).
† Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative B

Under Alternative B, BLM management actions would have similar effects to Alternative A in terms of future oil and gas development and related economic activity.

Actions Affecting Cost and Complexity of Oil and Gas Operations

Like Alternative A, Alternative B includes actions and requirements that could affect the financial viability of some future oil and gas developments, particularly during periods when oil and gas prices are low. However, the more detailed assessment of these actions and requirements in Section 4.3.1.1 (Fluid Leasable Minerals) indicates their effects are likely minor in comparison to the effects of excluding additional lands from oil and gas development or imposing additional restrictions on surface use under Alternative B.

Air Resources

Most of the management requirements affecting oil and gas operations are the same as under Alternative A, though the sound deadening and lighting requirements would be limited to specified areas (such as LPC areas, SRMAs and ERMAs, and in proximity to human habitation and riparian areas) under Alternative B.

Actions Affecting Land Available to Oil and Gas Development and Potential Number of Wells Developed

Under Alternative B, approximately 1,539,240 acres of BLM-administered land would be open to oil and gas leasing with standard lease terms and conditions or with moderate constraints such as CSU. This is approximately 40% fewer acres than under the No Action Alternative and about 21% fewer acres than under Alternative A. The number of future wells that would be developed is assumed to be reduced by the same proportion.

Projected Direct/Indirect Oil and Gas-related Economic Effects of Alternative B

Under Alternative B, 2,336 fewer new wells on BLM-administered and split estate lands are projected to be developed over the 20-year planning period than under the No Action Alternative (and 927 fewer wells than under Alternative A). Correspondingly fewer jobs would be directly and indirectly supported by oil and gas activity on BLM-administered lands. Table 4-206 summarizes the projected differences between oil and gas-related economic activity under Alternative B, relative to the No Action Alternative. By year 10 of the planning period, oil and gas-related activity on BLM-administered lands is projected to support about 1,310 fewer jobs in the SESA than under the No Action Alternative, along with about $89 million less in annual labor earnings and $271 million less in annual regional economic output. These differences increase by year 20, when Alternative B is projected to support 1,948 fewer jobs related to oil and gas activity on BLM-administered lands than the No Action Alternative.

Relative to current conditions (2017), Alternative B would support about 1,098 fewer oil and gas-related jobs by year 10 of the planning period. By year 20, Alternative B is projected to support 1,524 fewer jobs than existing conditions.

Table 4-206. Projected Direct/Indirect Economic Effects from Oil and Gas Activity on BLM-administered Lands under Alternative B

Direct/Indirect Effects	Projections for Alternative B		Projected Differences Between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Number of acres available for leasing*	1,539,240	1,539,240	-1,016,040	-1,016,040	-1,016,040	-1,016,040
Annual number of wells drilled	177	177	-117	-117	-117	-117
Total active wells	15,762	14,982	-623	-1,403	-1,012	-2,180
Drilling related jobs†	1,115	1,115	-736	-736	-736	-736
Maintenance-related jobs†	8,566	8,140	-362	-787	-574	-1,212
Total jobs†	9,681	9,255	-1,098	-1,523	-1,310	-1,948
Total labor earnings† (millions of 2014 dollars)	$727	$695	-$73	-$106	-$89	-$138
Total regional output† (millions of 2014 dollars)	$2,012	$1,923	-$227	$316	-$271	-$404

* Open with standard terms and conditions or open with moderate constraints (CSU).
† Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative C

Under Alternative C, more acres would be open for oil and gas development or available for development with moderate constraints than under Alternatives A or B. Consequently, under Alternative C, BLM management actions would have less adverse impact on future oil and gas development on BLM-administered lands, and related economic activity, than under Alternatives A or B.

Actions Affecting Cost and Complexity of Oil and Gas Operations

While Alternative C also includes actions and requirements that could adversely affect the cost and complexity of future oil and gas developments relative to the No Action Alternative, there are fewer such requirements than under Alternatives A or B. Like the other action alternatives, the more detailed assessment of these actions and requirements in Section 4.3.1.1 (Fluid Leasable Minerals) indicates their effects are likely minor in comparison to the effects of excluding lands from oil and gas development or imposing additional restrictions on surface use.

Air Resources

Under Alternative C, VRUs would be required for new wells on a case-by-case basis, rather than as a general practice. Emission controls to limit VOC emissions would be required only for larger emission sources. Electric compressor and well head pump engines would not be required.

Actions Affecting Land Available to Oil and Gas Development and Potential Number of Wells Developed

Under Alternative C, approximately 2,537,155 acres of BLM-administered and split estate land would be open to oil and gas leasing with standard lease terms and conditions or with moderate constraints such as CSU. This figure is approximately 1% fewer acres than under the No Action Alternative, but about 31% more acres than under Alternative A and 65% more acres than under Alternative B. The number of future wells that would be developed has been estimated based on these acreage projections.

Projected Direct/Indirect Oil and Gas-related Economic Effects of Alternative C

Under Alternative C, 42 fewer new wells on BLM-administered lands are projected to be developed over the 20-year planning period than under the No Action Alternative (but 1,367 more wells than under Alternative A and 2,294 more wells than under Alternative B). Table 4-207 summarizes the projected differences between oil and gas-related economic activity under Alternative C relative to the No Action Alternative. By year 10 of the planning period, oil and gas-related activity on BLM-administered and split estate lands is projected to support about 23 fewer jobs in the SESA than under the No Action Alternative, along with about $2 million less in annual labor earnings and $5 million less in annual regional economic output. These differences increase slightly by year 20, when Alternative C is projected to support 34 fewer jobs related to oil and gas activity on BLM-administered lands than the No Action Alternative.

Relative to Alternatives A or B, however, Alternative C is projected to support at least 765 more oil and gas-related jobs in year 10 of the planning period and at least 1,140 more oil and gas-related jobs by the end of the planning period in year 20.

Relative to current conditions (2017), Alternative C would support more oil and gas-related jobs from activity on BLM-administered lands throughout the entire planning period. By the end of the planning period, projected oil and gas-related employment would be 11,169 jobs, 390 more jobs than in 2017.

Table 4-207. Projected Direct/Indirect Economic Effects from Oil and Gas Activity on BLM-administered Lands under Alternative C

Direct/Indirect Effects	Projections for Alternative C		Projected Differences Between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Number of acres available for leasing*	2,537,155	2,537,155	-18,125	-18,125	-18,125	-18,125
Annual number of wells drilled	292	292	-2	-2	-2	-2
Total active wells	16,753	17,121	189	390	-23	-34
Drilling-related jobs†	1,838	1,838	-13	-13	-13	-13
Maintenance-related jobs†	9,129	9,330	202	403	-10	-21
Total jobs†	10,968	11,169	189	390	-23	-34
Total labor earnings† (millions of 2014 dollars)	$815	$831	$15	$30	-$2	-$2
Total regional output† (millions of 2014 dollars)	$2,278	$2,320	$39	$81	-$5	-$7

* Open with standard terms and conditions or open with moderate constraints (CSU).
† Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative D

Among the four action alternatives, Alternative D would be the only alternative that would increase future oil and gas development on BLM-administered lands beyond the No Action Alternative.

Actions Affecting Cost and Complexity of Oil and Gas Operations

Air Resources

Relatively few new requirements would be imposed on oil and gas operations for air resource purposes under Alternative D. VRUs would not be required. Other requirements are generally the same as under Alternative C.

Actions Affecting Land Available to Oil and Gas Development and Potential Number of Wells Developed

Under Alternative D, approximately 2,629,315 acres of BLM-administered and split estate land would be open to oil and gas leasing with standard lease terms and conditions or with moderate constraints such as CSU. This figure is approximately 3% more acres than under the No Action Alternative and 35% to 71% more acres than under Alternatives A or B. It is also about 4% more acres than under Alternative C. The number of future wells that would be developed has been estimated based on these acreage projections.

Projected Direct/Indirect Oil and Gas-related Economic Effects of Alternative D

Under Alternative D, 170 more new wells on BLM-administered and split estate lands are projected to be developed over the 20-year planning period than under the No Action Alternative. Alternative D is the only action alternative that is projected to result in more oil and gas development on BLM-administered lands than the No Action Alternative. Table 4-208 summarizes the projected differences between oil and gas-related economic activity under Alternative D relative to the No Action Alternative. By year 10 of the planning period, oil and gas-related activity on BLM-administered lands is projected to support about 96 more jobs in the SESA than under the No Action Alternative, along with about $7 million more in annual labor earnings and $20 million more in annual regional economic output. These differences increase by year 20, when Alternative D is projected to support 142 more jobs related to oil and gas activity on BLM-administered lands than the No Action Alternative.

The differences in projected oil and gas-related economic activity between Alternative D and the other action alternatives are larger than the differences between Alternative D and the No Action Alternative. By the end of the planning period in year 20, Alternative D is projected to support more than 1,300 more oil and gas-related jobs than Alternatives A or B. Alternative D is projected to support about 175 more oil and gas-related jobs in year 20 than Alternative C.

Relative to current conditions (2017), Alternative D would see the largest growth in oil and gas-related employment during the planning period. By the end of the planning period, projected oil and gas-related employment would be approximately 11,345 jobs, almost 570 more jobs than in 2017.

Table 4-208. Projected Direct/Indirect Economic Effects from Oil and Gas Activity on BLM-administered Lands under Alternative D

Direct/Indirect Effects	Projections for Alternative D		Projected Differences Between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Number of acres available for leasing*	2,629,315	2,629,315	74,035	74,035	74,035	74,035
Annual number of wells drilled	302	302	8	8	8	8
Total active wells	16,859	17,332	474	947	85	170
Drilling-related jobs†	1,905	1,905	54	54	54	54
Maintenance-related jobs†	9,181	9,440	254	513	42	88

Direct/Indirect Effects	Projections for Alternative D		Projected Differences Between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Total jobs†	11,086	11,345	308	567	96	142
Total labor earnings† (millions of 2014 dollars)	$823	$843	$23	$43	$7	$10
Total regional output† (millions of 2014 dollars)	$2,303	$2,356	$64	$118	$20	$29

* Includes direct effects and secondary regional economic effects estimated using IMPLAN.
† Includes direct effects and secondary regional economic effects estimated using IMPLAN.

4.5.2.2.2 Actions Affecting Other Mineral-related Economic Activity

Salable minerals (also referred to as mineral materials), such as caliche, sand, gravel, and other minerals used in construction, are prevalent throughout the CFO planning area. As shown in I 3.3-12 in Chapter 3, caliche sales account for most mineral material sales activity within the planning area in recent years. Caliche sales have been primarily due to oil and gas development. The BLM also can provide free gravel, sand, caliche, or other mineral materials to governments and non-profit organizations.

Other economic activity related to mineral resources managed by the CFO includes jobs from potash and sodium mining. As described in Chapter 3, as of 2011 the three active potash mines operating within the CFO employed more than 1,200 workers. The one active sodium mine employed about 75 workers in 2011. The following socioeconomic effects assessment focuses on the key effects on solid leasable minerals described in Section 4.3.1.1.2 and their potential economic ramifications.

Impacts from the No Action Alternative

Under the No Action Alternative, 2,637,465 acres would be available for salable mineral development, while 146,568 acres would be closed to salable mineral development. These allocations are the same as under existing conditions and consequently would not affect the availability or cost of salable mineral development.

Under the No Action Alternative, 174,391 acres (6% of BLM-administered lands in the planning area) would continue to be closed to solid leasable mineral development. Potash mining is expected to expand over the 20-year planning period. In addition to the three mines that were operating in 2011, a new in-situ mine was recently permitted and another proposed mine is currently under consideration. The assessment of solid leasable minerals in Section 4.3.1.1.2 concluded that a total of two new mines would be added to the three operating mines and the recently permitted mine by the end of the 20-year planning period.

Table 4-209 summarizes the projected direct and indirect economic effects of potash mining on lands managed by the CFO over the 20-year planning period. Including the recently permitted in-situ mine and the two new mines projected to be added over the planning period, total potash-related employment is projected to double from 2,076 jobs in the SESA in 2011 to 4,152 potash-related jobs by planning year 20. Annual regional economic output related to potash mining would also double from $370 million in 2011 to $740 million by planning year 20.

Table 4-209. Projected Direct/Indirect Economic Effects from Potash Mining on BLM-administered Lands under the No Action Alternative

Direct/Indirect Effects	Current (2011)	Projected Changes from Current	
		Planning Year 10	Planning Year 20
Number of active mines	3	2	3
Total jobs*	2,076	1,384	2,076
Total labor earnings* (millions of 2014 dollars)	$148	$98	$148
Total regional output* (millions of 2014 dollars)	$370	$246	$370

* Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative A

Under Alternative A, 1,179,104 acres would be open without constraints to salable mineral development, about 55% less than under the No Action Alternative. A total of 561,995 acres would be closed to salable mineral development, and 1,043,152 acres would be classified as "avoid," or open with moderate constraints, Relative to the No Action Alternative, Alternative A would reduce flexibility in where salable minerals can be acquired and potentially increase costs in acquiring these materials.

Under Alternative A, approximately 761,404 acres (27% of BLM-administered lands) would be closed to solid leasable mineral development. However, because relatively little of the lands with high or moderate potential for potash development would be within areas closed to development, this more restrictive allocation of lands for solid leasable mineral development is not anticipated to effect the number of mines that would be active during the planning period. Consequently, the economic effects from potash mining under Alternative A would be the same as under the No Action Alternative.

Impacts from Alternative B

Under Alternative B, 1,122,020 acres would be open without constraints to salable mineral development, about 57% less than under the No Action Alternative. A total of 936,799 acres would be closed to salable mineral development, and 725,368 acres would be classified as "avoid," or open with moderate constraints, Alternative B would be similar to Alternative A, though slightly more restrictive, in terms of the availability of salable minerals and would further reduce flexibility in where salable minerals can be acquired and increase costs in acquiring these materials.

Alternative B would close 1,082,972 acres (39% of BLM-administered lands) to solid leasable mineral development. These lands are not expected to include substantial acreages with high or moderate potential for potash development and Alternative B is also not anticipated to affect the number of mines that would be active during the planning period. Consequently, the economic effects from potash mining under Alternative B would be the same as under the No Action Alternative.

Impacts from Alternative C

Under Alternative C, 1,784,431 acres would be open without constraints to salable mineral development, about 32% less than under the No Action Alternative, but 51% to 59% more than under Alternatives A or B. A total of 247,323 acres would be closed to salable mineral development, and 752,286 acres would be classified as "avoid," or open with moderate constraints, Relative to the No Action Alternative, Alternative C would reduce flexibility in where salable minerals can be acquired and potentially increase acquisition costs, but these effects would be less than under Alternatives A or B.

Alternative C would close a little over 88,500 acres to solid leasable mineral development, far less than under Alternatives A or B. However, the same number of mines is projected to be developed under Alternative C as under the other alternatives. Consequently, the economic effects from potash mining under Alternative C would be the same as under the No Action Alternative or the other action alternatives.

Impacts from Alternative D

Under Alternative D, 2,028,324 acres would be open without constraints to salable mineral development, about 23% less than under the No Action Alternative, but considerably more than under the other action alternatives. A total of 153,174 acres would be closed to salable mineral development, and 602,621 acres would be classified as "avoid," or open with moderate constraints, Alternative D would have little impact on the flexibility in where salable minerals can be acquired and their acquisition costs relative to the No Action Alternative or existing conditions.

Alternative D would close just about 84,700 acres to solid leasable mineral development, similar to Alternative C and much less than under Alternatives A or B. The economic effects from potash mining under Alternative D would be the same as under the No Action Alternative or the other action alternatives.

4.5.2.2.3 Actions Affecting Agricultural (Grazing-related) Economic Activity

Agriculture, largely but not entirely based on raising cattle for meat and dairy production, is also an important component of the regional economy in the SESA (as described in Chapter 3). Just over 200 operators are permitted to graze livestock on federal lands managed by the CFO, which provided grazing totaling approximately 260,000 AUMs in 2010. As noted in Chapter 3, billed grazing use on CFO lands increased from 2000 through 2010, but remained nearly 30% or more below the full amount of potential grazing permitted or leased to operators during each year in the preceding decade.

Impacts from the No Action Alternative

Some management actions under the No Action Alternative would tend to promote grazing use and corresponding economic activity. Increased vegetation would be made available to any applicant who meets the mandatory qualifications. Nearly 17,000 AUMs that are inactive or in suspension would be made available to authorized permittees when resource conditions and vegetation monitoring indicate these AUMs can be supported.

Relatively minor adjustments would be made under the No Action Alternative that would slightly reduce grazing. Almost 5,000 acres in 13 SMAs would be removed from grazing to reduce potential conflicts with sensitive habitats and other multiple use values. Any AUMs retired in the LPC and DSL areas would be allocated to wildlife use. Any AUMs relinquished in the Hope Study area or LPC Isolated Population Area would be retired to benefit wildlife and watershed health. Also, livestock use would be deferred for a minimum of two growing seasons following herbicide application in all locations.

Currently there are approximately 2 million acres of federal lands open for grazing within the SESA, on which there are 367,656 annual permitted AUMs. Under the No Action Alternative, the acreage open to grazing would be reduced by 1,939 acres, and the number of permitted AUMs would be reduced by 341.

Projected Direct/Indirect Grazing-related Economic Effects of the No Action Alternative

Based on IMPLAN analysis, the maximum historical billed use of CFO grazing lands (267,900 AUMs) supports approximately 137 direct and secondary jobs, as well as $3.7 million in labor earnings and $36 million in annual economic output. Table 4-210 summarizes the economic effects of current grazing activity (based on the maximum historical billed use in 2009). As shown in the table, the No Action Alternative would maintain current grazing conditions and have no effect on the agricultural economy relative to existing conditions.

Table 4-210. Potential Direct/Indirect Economic Effects from Grazing Activity on BLM-administered Lands under the No Action Alternative

Direct/Indirect Effects	Projections for No Action Alternative	Projected Differences from 2014 Conditions
Total number of open acres	2,086,107	None
Total permitted AUMs (potential use)*	367,315	None
Total billed AUMs (actual use†	267,900	None
Total jobs‡	136.6	0
Total labor earnings‡ (thousand 2014 dollars)	$3,696	$0
Total regional output‡ (thousand 2014 dollars)	$36,233	$0

* Maximum number of AUMs available.
† Projected AUMs actually used (see text). Existing conditions based on 2009 actual AUMs (highest number during 2000-2010 period).
‡ Includes direct effects and secondary regional economic effects estimated using IMPLAN.

The estimated economic contribution from grazing on CFO land provided in the preceding table may be a conservative estimate. This estimate reflects only the proportion of the value of the cattle that corresponds to the proportion of their lives spent grazing on public lands. However, studies have noted that the economic contribution from grazing on public lands may go beyond just the proportionate share of time that cattle are grazed on such lands. Some ranching operations may not be viable without access to seasonal grazing on public lands (Torrell 2014).

Impacts from Alternative A

Under Alternative A, less vegetation production would be allocated to grazing than under the No Action Alternative. In all, 487,909 fewer acres would be open for grazing and 86,350 fewer annual AUMs would be permitted annually than under the No Action Alternative.

Projected Direct/Indirect Grazing-related Economic Effects of the Alternative A

Table 4-211 summarizes the potential economic impacts of Alternative A compared to the No Action Alternative. As described in the assumptions discussion earlier in this section, the study team estimated a range of potential effects on grazing use, and the grazing-related economy. The “minimum effect” assumes ranchers would be able to reallocate their livestock, as necessary, to take advantage of any available (permitted) AUMs throughout the planning area. The “maximum effect” assumes that actual (billed) use would decline in proportion to the reduction in permitted AUMs compared to the No Action Alternative. Based on these varied assumptions, Alternative A is projected to result in a decrease of between 0 and 32 agriculture-related jobs and a reduction of between $0 and $0.9 million in labor earnings annually. Annual agriculture-related economic output in the SESA directly and indirectly related to grazing would be reduced by between $0 and $8.5 million.

Table 4-211. Potential Direct/Indirect Economic Effects from Grazing Activity on BLM-administered Lands under Alternative A

Direct/Indirect Effects	Projections for Alternative A		Projected Differences Between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect
Total number of open acres	1,598,198		-487,909		-487,909	
Total permitted AUMs (potential use)*	280,965		-86,350		-86,350	
Total billed AUMs (actual use)†	267,900	204,921	0	-62,979	0	-62,979
Total jobs‡	136.6	104.5	0.0	-32.1	0.0	-32.1
Total labor earnings‡ (thousand 2014 dollars)	$3,696	$2,827	$0	-$869	$0	-$869
Total regional output‡ (thousand 2014 dollars)	$36,233	$27,715	-$0	-$8,518	-$0	-$8,518

* Maximum number of AUMs available.
† Projected AUMs actually used (see text).
‡ Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative B

Alternative B would reduce the number of acres available for grazing and number of permitted AUMs relative to existing conditions or the No Action Alternative, but would permit more AUMs than Alternative A.

Projected Direct/Indirect Grazing-related Economic Effects of the Alternative B

Table 4-212 summarizes the potential economic impacts of Alternative B compared to the No Action Alternative. The "minimum effect" assumes ranchers would be able to reallocate their livestock, as necessary, to take advantage of any available (permitted) AUMs throughout the planning area. The "maximum effect" assumes that actual (billed) use would decline in proportion to the reduction in permitted AUMs compared to the No Action Alternative. Based on these varied assumptions, Alternative B is projected to result in a decrease of between 0 and 10 agriculture-related jobs and a reduction of between $0 and $268,000 in annual labor earnings. Annual agriculture-related economic output in the SESA directly and indirectly related to grazing would be reduced by between $0 and $2.6 million.

Table 4-212. Potential Direct/Indirect Economic Effects from Grazing Activity on BLM-administered Lands under Alternative B

Direct/Indirect Effects	Projections for Alternative B		Projected Differences Between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect
Total number of open acres	1,937,725		-148,382		-148,382	
Total permitted AUMs (potential use)*	340,656		-26,659		-26,659	
Total billed AUMs (actual use)†	267,900	248,456	0	-19,444	0	-19,444
Total jobs‡	136.6	126.7	0.0	-9.9	0.0	-9.9

Direct/Indirect Effects	Projections for Alternative B		Projected Differences Between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect
Total labor earnings‡ (thousand 2014 dollars)	$3,696	$3,428	$0	-$268	$0	-$268
Total regional output‡ (thousand 2014 dollars)	$36,233	$33,603	$0	-$2,630	$0	-$2,630

* Maximum number of AUMs available.
† Projected AUMs actually used (see text).
‡ Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative C

Compared to Alternatives A and B, Alternative C would withdraw fewer areas from grazing use and support more permitted AUMs.

Projected Direct/Indirect Grazing-related Economic Effects of the Alternative C

Table 4-213 summarizes the projected regional economic differences between Alternative C and the No Action Alternative. The "minimum effect" assumes ranchers would be able to reallocate their livestock, as necessary, to take advantage of any available (permitted) AUMs throughout the planning area. The "maximum effect" assumes that actual (billed) use would decline in proportion to the reduction in permitted AUMs compared to the No Action Alternative. Under either assumption, the projected economic effects of Alternative C on agriculture-related jobs, labor earnings and economic output would be minimal.

Table 4-213. Potential Direct/Indirect Economic Effects from Grazing Activity on BLM-administered Lands under Alternative C

Direct/Indirect Effects	Projections for Alternative C		Projected Differences Between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect
Total number of open acres	2,083,232		-2,875		-2,875	
Total permitted AUMs (potential use)*	366,229		-1,086		-1,086	
Total billed AUMs (actual use)†	267,900	267,108	0	-792	0	-792
Total jobs‡	136.6	136.2	0.0	-0.4	0.0	-0.4
Total labor earnings‡ (thousand 2014 dollars)	$3,696	$3,685	$0	-$11	$0	-$11
Total regional output‡ (thousand 2014 dollars)	$36,233	$36,126	$0	-$107	$0	-$107

* Maximum number of AUMs available.
† Projected AUMs actually used (see text).
‡ Includes direct effects and secondary regional economic effects estimated using IMPLAN.

Impacts from Alternative D

Like Alternative C, Alternative D would withdraw fewer areas from grazing use and support more AUMs than Alternative A or Alternative B.

Projected Direct/Indirect Grazing-related Economic Effects of the Alternative D

Table 4-214 summarizes the potential regional economic differences between Alternative D and the No Action Alternative.

The "minimum effect" assumes ranchers would be able to reallocate their livestock, as necessary, to take advantage of any available (permitted) AUMs throughout the planning area. The "maximum effect" assumes that actual (billed) use would decline in proportion to the reduction in permitted AUMs compared to the No Action Alternative. Under either assumption, the projected economic effects of Alternative D on agriculture-related jobs, labor earnings and economic output would be minimal.

Table 4-214. Potential Direct/Indirect Economic Effects from Grazing Activity on BLM-administered Lands under Alternative D

Direct/Indirect Effects	Projections for Alternative D		Projected Differences Between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect	Minimum Effect	Maximum Effect
Total number of open acres	2,087,759		1,652		1,652	
Total permitted AUMs (potential use)*	367,024		-291		-291	
Total billed AUMs (actual use)†	267,900	267,688	0	-212	0	-212
Total jobs‡	136.6	136.5	0.0	-0.1	0.0	-0.1
Total labor earnings‡ (thousand 2014 dollars)	$3,696	$3,693	$0	-$3	$0	-$3
Total regional output‡ (thousand 2014 dollars)	$36,233	$36,204	$0	-$29	$0	-$29

* Maximum number of AUMs available.
† Projected AUMs actually used (see text).
‡ Includes direct effects and secondary regional economic effects estimated using IMPLAN.

4.5.2.2.4 Actions Affecting Recreation-related Economic Activity

Lands managed by the CFO provide an important contribution to recreation-related economic activity in the SESA, such as sales of food, gasoline, lodging, services, and other retail goods to recreationists. As described in Chapter 3, there was an average of nearly 100,000 recreational visits to CFO-managed lands from 2007 to 2011 and expenditures by these visitors were estimated to average approximately $5.4 million per year. BLM data indicate that the lands managed by the CFO accounted for about 4.7% of all recreation visits to BLM-administered lands in New Mexico in 2010. Based on this proportion, CFO recreation is estimated to support approximately 62 direct jobs in the SESA and 92 total jobs—including indirect and induced economic effects. These totals are little less than 5% of the 1,327 direct jobs and 1,953 total jobs, supported by recreation on all BLM-administered lands in New Mexico.

Proposed BLM management actions in several categories may impact future recreation and corresponding economic activity in the SESA related to recreation on CFO-managed lands. The recreation effects assessment (see Section 4.3.5) provides greater detail regarding the effects of management actions on recreation. The following discussion of impacts of the management alternatives on the recreation-related economy summarizes findings from the recreation effects assessment to highlight the management actions likely to have the largest effects on recreation and recreation-related economic activity.

Impacts from Management Common to All

Management actions common to all alternatives in a number of areas would continue to protect and enhance recreation opportunities and the recreational experience on CFO-managed lands, as well as the recreation-related economy. As described in Section 4.3.5, management actions common to all in the following areas have implications for recreation (and, consequently, for the recreation-related economy):

- Recreation
- Air Quality
- Backcountry Byways
- Cave and Karst Resources
- Wildland Fire Management
- Minerals
- Livestock Grazing
- Special Designation (WSA)
- Travel Management
- Vegetation
- Visual Resources

Impacts from Management Common to All Action Alternatives

Management actions common to all action alternatives in many of the same areas listed above would also affect recreation use and recreation-related economic activity.

Impacts from the No Action Alternative

Under the No Action Alternative, Hackberry Lake and the Pecos River Corridor would be designated as SRMAs. These designations would benefit different groups of recreation users, as described in in Section 4.3.5, potentially encouraging recreation activity, spending and economic activity.

Most recreationists on lands managed by the CFO are residents of the region and recreation visits are increasing with regional population growth (BLM 2014b). Based on projected population growth in the region from the University of New Mexico (2012), Table 4-215 depicts projected recreation visits and economic activity directly and indirectly supported by recreation on CFO lands over the 20-year planning period.

Table 4-215. Projected Recreation Visits to the Planning Area and Direct/Indirect Economic Effects of Recreation under the No Action Alternative

Direct/Indirect Effects	Current (2011)	Projected Changes from Current	
		Planning Year 10	Planning Year 20
Annual recreation visits	99,393	12,921	25,842
Recreation spending (millions in 2014 dollars)	$5.4	$0.7	$1.4
Total jobs*	***92***	***12***	***24***

* Includes direct effects and secondary regional economic effects based on USDI estimates of recreation employment supported by BLM-administered lands in New Mexico (2011).

Impacts from Alternative A

Under Alternative A, additional areas would be designated as SRMAs. Designation of the Alkali Lake SRMA would likely improve long-term recreation opportunities for OHV users, while designations of SRMAs at Conoco Lake and La Cueva would benefit non-mechanized recreationists. Square Lake would be designated as an ERMA, with long-term beneficial effects for OHV users.

However, the recreation management actions under any of the action alternatives are unlikely to have a quantifiable effect on recreation visits to the planning area. Residents that want to recreate outdoors will adapt to the alternatives and continue to use the BLM-administered lands (BLM 2014b). Consequently, the economic effects of recreation on BLM-administered lands are projected to remain the same under Alternative A as under the No Action Alternative**.**

Impacts from Alternative B

Recreation management actions under Alternative B would generally be similar to those under Alternative A, with the exceptions that the West Wells Dune would be designated as an ERMA and the Pecos River Equestrian area and Hay Hollow Equestrian area would be designated as ERMAs.

These management actions would particularly benefit equestrian users, but impacts on overall recreation visitation, spending and economic activity cannot be projected. The overall economic effects of recreation on BLM-administered lands are projected to remain the same under each of the action alternatives as under the No Action Alternative**.**

Impacts from Alternative C

Recreation management actions under Alternative C would generally be similar to those under Alternative B, with the following exceptions. Alkali Lake would be designated as an ERMA, rather than a SRMA, and the Hay Hollow Equestrian area would not receive a designation. Consequently, there would likely be less beneficial effects for recreation users (particularly equestrian users) under Alternative C than under Alternative B, but impacts on overall recreation visitation, spending and economic activity cannot be projected. The overall economic effects of recreation on BLM-administered lands are projected to remain the same under each of the action alternatives as under the No Action Alternative**.**

Impacts from Alternative D

In general, recreation management actions under Alternative D would be similar to Alternative C. As described previously for Alternative A, the economic effects of recreation on BLM-administered lands are projected to remain the same under each of the action alternatives as under the No Action Alternative**.**

4.5.2.2.5 Actions Affecting Non-Market Economic Values

Historically, economic evaluations associated with public lands have focused primarily on market values, capturing the contribution of public lands to the value of goods and services that are traded in the economy. The preceding sections discussing the effects of the management alternatives on the oil and gas-related economy, other minerals-related economic activity, the agricultural economy, and the recreation-related economy are examples of this type of economic analysis known as a regional economic impact analysis.

There is increasing recognition that public lands provide economic values that are not necessarily part of traditional market transactions. “Non-market” economic values include both values received by public land users (typically recreation users) that are not fully captured in the market place and passive or non-use values that may accrue to people even if they never actually visit or otherwise use the public lands.

Non-market recreation values reflect how much people value their own participation in recreation activities, over and above what they have to pay to participate. This concept can also be described in terms of “consumer’s surplus,” or the amount that individuals would be willing to pay to be able to participate in particular recreation activities (or how much they would be willing to accept to forego participation in those activities), net of the costs they actually incur for the recreational experience.

Passive or non-use values include amenity values and the value of ecosystem support services. There is growing evidence that people value the experience of living in proximity to relatively pristine, undeveloped public lands. Studies indicate a migration trend motivated by natural amenities and quality of life considerations (Cordell et al. 2011; Johnson and Rasker 1995; McGranahan 1999; Rudzitis 1999). This “amenity migration” is especially prevalent in rural areas of western states and represents a shift from traditional western migration, which centered on employment opportunities, often related to resource

extraction. In this relatively new amenity-based trend, location choices are influenced by natural landscapes, scenery, recreation opportunities, and climate more than economic opportunity. A 2011 USFS study estimated the impacts of specific natural amenities on rural population migration through a regression analysis of over 2,000 rural counties in the United States. These results indicate that federally managed lands, open rangeland, forest land, and pasture lands are all correlated with higher rates of migration to rural counties.

Recently, there has also been greater effort to identify and quantify the value of the ecological, or ecosystem, resources provided by public lands. Forest, shrub lands, wetlands, and other undeveloped lands provide a host of ecological services, including carbon sequestration, water filtering and purification, erosion control, and habitat for a diversity of species. While there is a growing body of literature on this topic and rough value estimates have been developed for some of these services, this form of economic valuation is still in the relatively early stages of development.

BLM guidance documents require that at least a qualitative assessment should be provided regarding impacts to non-market values and that these values should be quantified where relevant and feasible (BLM IM 2013-131). Given very limited information on current non-market values associated with the lands managed by the CFO, the following assessment is qualitative in nature.

The results of this assessment should not be compared to the results of the regional economic impact analyses in the preceding sections. As described previously, the regional economic impact analyses track estimates of the *economic activity* that a given management decision is expected to create within the SESA. This level of analysis provides important information on the distributional effects of a management decision. Assessing non-market values explicitly considers the value of a good or service as measured by "consumer surplus" – consumer surplus is a measure of social welfare and is not comparable with indicators of economic activity.

Impacts from Management Common to All

In general, the following types of management actions will likely tend to increase the non-market values associated with lands managed by the CFO by maintaining or improving resource conditions:

- Actions that enhance the quality or opportunities for recreation users that prefer a natural-appearing environment with little evidence of disturbance
- Actions that preserve relatively pristine and undeveloped areas
- Actions that preserve cultural sites
- Actions that maintain or enhance visual resource qualities
- Actions that promote the health and survival of fish and wildlife

Management actions common to all alternatives include actions that would continue to be undertaken under the No Action Alternative, as well as under any of the action alternatives. Management actions common to all alternatives relevant to non-market values include the following resource management areas.

Land Tenure

All lands not specifically identified for disposal in the RMP would continue to be owned by the federal government and managed for multiple uses. This action would protect and maintain current non-market values associated with BLM-administered lands.

Special Designations – Wilderness Study Areas

WSAs would be closed to oil and gas leasing unless and until it is determined that they will not be designated as wilderness. These areas would be managed in accordance with the BLM's Management of Wilderness Study Areas Manual. This action would also protect and maintain current non-market values associated with BLM-administered lands.

Travel Management

Motorized cross country travel for lessees and permittees would be limited to travel necessary to administer their lease or permit. They would not be allowed to drive cross-country for other purposes like hunting or recreation. The Phantom Banks Heronries would be designated as limited to OHV use and seasonal limitations would be imposed to protect active heronries. These actions would protect and maintain current non-market values associated with BLM-administered lands.

Under all of the alternatives, including No Action, travel would be either OHV limited or closed, and there would be no open areas with unrestricted travel.

Visual Resource Management

Scenic leased areas would have planned utility corridors to minimize cumulative impacts to visual resource quality. This action would also protect and maintain current non-market values associated with CFO lands.

Collectively, these and other management actions common to all alternatives do not represent a change from existing management conditions. However, these ongoing management measures would continue to protect and promote non-market values.

Impacts from Management Common to All Action Alternatives

Management actions common to all action alternatives that are relevant to non-market values include the following resource management areas.

Land Tenure

The BLM would seek to close springs and seeps to salables and mineral disposal and withdraw these areas from locatable mineral development. These actions would protect existing non-market values.

Recreation

Two management actions common to all action alternatives would help preserve non-market values. Camping would be prohibited within 300 feet of any water sources and no permanent rock climbing aids (e.g., bolts, anchors) would be allowed to be placed on routes without prior coordination with the CFO.

Areas of Critical Environmental Concern

Each of the action alternatives would designate at least five ACECs to protect important biological, cultural, scenic, or historic resources. These actions would help to preserve and enhance non-market values.

Travel Management

All of the action alternatives would require the removal of any road surfacing material when oil and gas wells are abandoned. This action would reduce the long-term visual impact of oil and gas development and would enhance non-market values.

Impacts from the No Action Alternative

Minerals Allocations

The No Action Alternative would close approximately 174,000 acres to leasable mineral development (e.g., oil and gas, potash, sodium) and place major constraints such as NSO on an additional 55,000 acres. While these restrictions would tend to protect non-market values, the total acreage closed or open with major constraints under the No Action Alternative is less than under any of the action alternatives except Alternative D.

Lands with Wilderness Characteristics

Under the No Action Alternative, no lands would be managed as lands with wilderness characteristics. Consequently these types of lands, and the non-market values associated with them, would receive the least protection under the No Action Alternative.

Areas of Critical Environmental Concern

No areas would be designated as ACECs under the No Action Alternative. Consequently, these types of lands, and the non-market values associated with them, would receive the least protection under the No Action Alternative.

Wild and Scenic Rivers

Under the No Action Alternative, neither the Black River nor the Delaware River would be managed as WSRs, pending designation by Congress. The non-market values associated with these rivers would not receive the additional protection provided by managing to WSR objectives.

Overall, the No Action Alternative likely would provide the least protection for non-market values among the alternatives being considered in this RMP.

Impacts from Alternative A

Minerals Allocations

Alternative A would close approximately 761,000 acres to leasable mineral development (e.g., oil and gas, potash, sodium) and place major constraints such as NSO on an additional 80,000 acres. Among all of the alternatives, only Alternative B would close or place major restrictions on more land for leasable mineral development. Mineral allocations under Alternative A would be highly protective of non-market values related to lands managed by the CFO.

Lands with Wilderness Characteristics

Alternative A would manage 11 units totaling almost 67,000 acres as lands with wilderness characteristics. This is the most acreage that would be managed to preserve wilderness characteristics under any of the alternatives and these actions would serve to protect and enhance non-market values associated with these lands.

Areas of Critical Environmental Concern

Alternative A would designate nine areas as ACECs. This is fewer than would be designated as ACECs under Alternative B (15 areas) and similar to the eight areas that would be designated as ACECs under Alternative C. These designations would tend to preserve and enhance non-market values.

Wild and Scenic Rivers

Under Alternative A, both the Black River and the Delaware River would be managed as WSRs, pending designation by Congress. The non-market values associated with these rivers would receive the additional protection provided by managing to WSR objectives.

Overall, Alternative A would do more to protect and enhance non-market values than the No Action Alternative, Alternative C, or Alternative D.

Impacts from Alternative B

Minerals Allocations

Alternative B would close approximately 1,083,000 acres to leasable mineral development (e.g., oil and gas, potash, sodium) and place major constraints such as NSO on an additional 162,000 acres. Among all of the alternatives, Alternative B would close or place major restrictions on the most land for leasable mineral development. Mineral allocations under Alternative B, like Alternative A, would be highly protective of non-market values related to lands managed by the CFO.

Lands with Wilderness Characteristics

Alternative B would manage about 48,000 acres to protect lands with wilderness characteristics. This is less acreage that would be managed to preserve wilderness characteristics than Alternative A, but slightly more than under Alternative C. Managing these areas as lands with wilderness characteristics would serve to protect and enhance non-market values associated with these lands.

Areas of Critical Environmental Concern

Alternative B would designate 15 areas as ACECs, the most under any of the alternatives. These designations would tend to preserve and enhance non-market values.

Wild and Scenic Rivers

Under Alternative B, the Black River would be managed as a WSR, pending designation by Congress, but the Delaware River would not. The non-market values associated with the Black River would receive the additional protection provided by managing to WSR objectives.

Overall, the Alternative B would provide a similar level of protection for non-market values to Alternative A.

Impacts from Alternative C

Minerals Allocations

Alternative C would close approximately 89,000 acres to leasable mineral development (e.g., oil and gas, potash, sodium) and place major constraints such as NSO on an additional 158,000 acres. Alternative C would close or place major restrictions on substantially less land for leasable mineral development than Alternatives A and B, but would close or restrict more land than Alternative D or the No Action Alternative.

Lands with Wilderness Characteristics

Alternative C would manage about 5,119 acres to protect lands with wilderness characteristics. This is much less acreage that would be managed to preserve wilderness characteristics than Alternative B, but more than under Alternative D. Managing these areas as lands with wilderness characteristics would serve to protect and enhance non-market values associated with these lands.

Areas of Critical Environmental Concern

Alternative C would designate eight areas as ACECs, similar to Alternative A, less than Alternative B, but more than Alternative D. These designations would tend to preserve and enhance non-market values.

Wild and Scenic Rivers

Under Alternative C, like Alternative B, the Black River would be managed as a WSR but the Delaware River would not. The non-market values associated with the Black River would receive the additional protection provided by managing to WSR objectives.

Overall, the Alternative C would provide less protection for non-market values than Alternatives A or B, but more protection than Alternative D or the No Action Alternative.

Impacts from Alternative D

Minerals Allocations

Alternative D would close approximately 85,000 acres to leasable mineral development (e.g., oil and gas, potash, sodium) and place major constraints such as NSO on an additional 70,000 acres. Overall, Alternative D would restrict the fewest acres from mineral development with surface occupancy and would provide the least protection for non-market values in this regard.

Lands with Wilderness Characteristics

Alternative D would manage about 1,221 acres to protect lands with wilderness characteristics. This is considerably less acreage than would be managed to preserve wilderness characteristics under the other action alternatives and would provide less protection for non-market values associated with these lands.

Areas of Critical Environmental Concern

Alternative D would designate five areas as ACECs, again the least of any of the action alternatives. As these designations tend to preserve and enhance non-market values, Alternative D would again provide the least protection for the non-market values associated with these lands among the action alternatives.

Wild and Scenic Rivers

Under Alternative D, like Alternatives B and C, the Black River would be managed as a WSR but the Delaware River would not. The non-market values associated with the Black River would receive the additional protection provided by managing to WSR objectives.

Overall, the Alternative D would provide the least protection for non-market values among the action alternatives. By including some lands that would be managed as lands with wilderness characteristics, ACECs, or WSRs, Alternative D offers more protection for non-market values in certain respects than the No Action Alternative. However, the No Action Alternative would restrict more land from mineral development with surface occupancy than Alternative D.

4.5.2.2.6 Summary of Economic Effects by Alternative

The following discussion summarizes projected effects on the SESA economy from activities on CFO-managed lands under each of the alternatives. In addition to the projected effects from mineral, grazing, and recreation-related activities described earlier in this section, this summary also notes the regional economic effects from direct BLM employment and expenditures, but does not attempt to project BLM budgets or expenditures in the future (which depend on Federal budget priorities). For purposes of simplicity and presentation, projected economic effects from grazing are based on the midpoint of the ranges of potential effects projected earlier for each alternative. The discussion concludes with a summary of effects on state, local, and federal tax revenues for each alternative.

Projected Economic Effects from the No Action Alternative

Currently (2017), CFO direct expenditures and activities on BLM-managed and split estate lands support almost 13,100 jobs in the SESA. Under the No Action Alternative, more than 1,600 more jobs would be supported by the tenth year of the planning period and about 2,500 more jobs would be supported by the end of the planning period. Most of the employment growth would be due to increases in oil and gas-related activity and additional potash mining. Table 4-216 summarizes projected employment directly and indirectly related to activities on BLM-managed lands, as well as BLM direct employment and expenditures, under the No Action Alternative. BLM employment and expenditures are driven by federal budget priorities and processes and were not projected over the 20-year planning period.

Table 4-216. Summary of Projected Direct/Indirect Employment Effects under the No Action Alternative

Jobs	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	10,991	11,203	212	424
Other mineral-related	3,460	4,152	1,384	2,076
Grazing-related	137	137	None	None
Recreation-related	104	116	12	24
BLM employment and spending-related*	NA	NA	NA	NA
Total jobs	***14,692***	***15,608***	***1,608***	***2,524***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Activities on BLM-managed and split estate lands and direct employment and expenditures by the CFO currently generate an estimated $155 million per year in state and local tax revenues. Under the No Action Alternative, annual state and local tax revenues related to the CFO are projected to grow by approximately $17 million by year 10 of the planning period and by $27 million per year by the end of the planning period. These increases in tax revenues are due to projected increases in oil and gas and potash activity, as summarized in Table 4-217.

Table 4-217. Summary of Projected Direct/Indirect Effects on Annual State and Local Tax Revenues under the No Action Alternative (millions of 2014 dollars)

Revenues	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$134.9	$137.7	$2.9	$5.7
Other mineral-related	$36.2	$43.4	$14.5	$21.7
Grazing-related	$1.1	$1.1	$0.0	$0.0
Recreation-related*	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA
Total revenues	***$172.2***	***$182.2***	***$17.4***	***$27.4***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Activities on BLM-managed lands and direct employment and expenditures by the CFO currently generate an estimated $204 million per year in federal tax revenues. Under the No Action Alternative, annual federal revenues related to the CFO are projected to grow by approximately $27 million by year 10 of the planning period and by $43 million per year by the end of the planning period. These increases in tax revenues are due to projected increases in oil and gas and potash activity, as summarized in Table 4-218.

Table 4-218. Summary of Projected Direct/Indirect Effects on Annual Federal Tax Revenues under the No Action Alternative (millions of 2014 dollars)

Revenues	Projections for No Action Alternative		Projected Differences from Existing Conditions	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$170.4	$172.7	$3.3	$6.7
Other mineral-related	$59.9	$71.9	$24.0	$35.9
Grazing-related	$1.1	$1.1	$0.0	$0.0
Recreation-related*	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA
Total revenues	***$231.4***	***$246.7***	***$27.3***	***$42.6***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Non-market values associated with lands managed by the CFO could not be quantified. However, as discussed earlier, the No Action Alternative is likely the least protective of these values among all of the alternatives and would likely result in the lowest total non-market value associated with BLM-managed lands.

Projected Economic Effects from Alternative A

Table 4-219 summarizes projected employment directly and indirectly related to activities on BLM-managed lands under Alternative A.

Alternative A is projected to support approximately 935 fewer jobs by year 10 of the planning period than the No Action Alternative and approximately 1,383 fewer jobs by the end of the 20-year planning period. These projected employment effects are primarily due to fewer oil and gas-related jobs, as well as a smaller reduction in grazing-related employment. However, total employment supported by BLM-managed lands under Alternative A during the planning period is still projected to exceed employment levels under existing conditions.

Table 4-219. Summary of Projected Direct/Indirect Employment Effects under Alternative A

Jobs	Projections for Alternative A		Projected Differences Between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	10,201	10,028	-578	-750	-790	-1,175
Other mineral-related	3,460	4,152	1,384	2,076	0	0
Grazing-related	121	121	-16	-16	-16	-16
Recreation-related	104	116	12	24	0	0
BLM employment and spending-related*	NA	NA	NA	NA	NA	NA
Total jobs	***13,886***	***14,417***	***802***	***1,333***	***-807***	***-1,191***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

State and local tax revenues under Alternative A are projected to be approximately $8 million less than under the No Action Alternative in year 10 of the planning period and approximately $13 million per year less than under the No Action Alternative by the end of the planning period. Tax revenues under Alternative A are, however, projected to be larger than under existing conditions due to projected increases in revenues from future potash mines ("other mineral-related" revenues). These effects are summarized in Table 4-220.

Table 4-220. Summary of Projected Direct/Indirect Effects on Annual State and Local Tax Revenues under Alternative A (millions of 2014 dollars)

Revenues	Projections for Alternative A		Projected Differences Between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$126.9	$125.1	-$5.1	-$7.0	-$8.0	-$12.7
Other mineral-related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing-related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$164.0***	***$169.4***	***$9.2***	***$14.5***	***-$8.2***	***-$12.9***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Under Alternative A, annual federal revenues related to the CFO are projected to be approximately $12 million lower than under the No Action Alternative by year 10 of the planning period and about $18 million per year lower than the No Action Alternative by the end of the planning period. Like state and local tax revenues, however, federal tax revenues under Alternative A are projected to be larger than current revenues (existing conditions). These effects are summarized in Table 4-221.

Table 4-221. Summary of Projected Direct/Indirect Effects on Annual Federal Tax Revenues under Alternative A (millions of 2014 dollars)

Revenues	Projections for Alternative A		Projected Differences Between Alternative A and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$158.0	$155.9	-$9.0	-11.2	-$12.3	-$17.8
Other mineral-related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing-related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$218.8***	***$228.7***	***$14.8***	***$24.5***	***-$12.5***	***-$18.0***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative A, along with Alternative B, would do the most to protect and enhance non-market values among all of the alternatives considered in this RMP.

Projected Economic Effects from Alternative B

Table 4-222 summarizes projected employment directly and indirectly related to activities on BLM-managed lands under Alternative B.

Alternative B is projected to support approximately 1,315 fewer jobs by the tenth year of the planning period than the No Action Alternative and approximately 1,953 fewer jobs by the end of the 20-year planning period. These projected employment effects are primarily due to fewer oil and gas-related jobs, as well as a smaller reduction in grazing-related employment. Overall, Alternative B would support the fewest jobs among all of the alternatives considered in this RMP. However, total employment supported by BLM-managed lands under Alternative B during the planning period is still projected to exceed current employment levels.

Table 4-222. Summary of Projected Direct/Indirect Employment Effects under Alternative B

Jobs	Projections for Alternative B		Projected Differences Between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	9,681	9,255	-1,098	-1,523	-1,310	-1,948
Other mineral-related	3,460	4,152	1,384	2,076	0	0
Grazing-related	132	132	-5	-5	-5	-5
Recreation-related	104	116	12	24	0	0
BLM employment and spending-related*	NA	NA	NA	NA	NA	NA
Total jobs	***13,377***	***13,655***	***293***	***572***	***-1,315***	***-1,953***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

State and local tax revenues under Alternative B are projected to be approximately $12 million less than under the No Action Alternative in year 10 of the planning period and approximately $21 million per year less than under the No Action Alternative by the end of the planning period. State and local tax revenues are, however, projected to be larger under Alternative B than existing conditions. These effects are summarized in Table 4-223.

Table 4-223. Summary of Projected Direct/Indirect Effects on Annual State and Local Tax Revenues under Alternative B (millions of 2014 dollars)

Revenues	Projections for Alternative B		Projected Differences Between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$122.8	$117.1	-$9.2	-$14.9	-$12.1	-$20.6
Other mineral-related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing-related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$159.9***	***$161.4***	***$5.1***	***$6.6***	***-$12.3***	***-$20.8***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Under Alternative B, annual federal revenues related to the CFO are projected to be approximately $19 million lower than under the No Action Alternative by year 10 of the planning period and about $29 million per year lower than the No Action Alternative by the end of the planning period. Due to projected increases in federal revenues from "other mineral-related activity" (new potash mines), federal revenues are projected to be greater under Alternative B than under existing conditions. These effects are summarized in Table 4-224.

Table 4-224. Summary of Projected Direct/Indirect Effects on Annual Federal Tax Revenues under Alternative B (millions of 2014 dollars)

Revenues	Projections for Alternative B		Projected Differences Between Alternative B and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$151.3	$144.6	-$15.8	-$22.5	-$19.1	-$29.1
Other mineral-related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing-related	$0.9	$0.9	-$0.2	-$0.2	-$0.2	-$0.2
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$212.1***	***$217.4***	***$8.0***	***$13.2***	***-$19.3***	***-$29.3***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative B, along with Alternative A, would do the most to protect and enhance non-market values among all of the alternatives considered in this RMP.

Projected Economic Effects under Alternative C

Table 4-225 summarizes projected employment directly and indirectly related to activities on BLM-managed lands under Alternative C.

Alternative C is projected to support approximately 24 fewer jobs by the tenth year of the planning period than the No Action Alternative and approximately 35 fewer jobs by the end of the 20-year planning period. These projected employment effects reflect fewer oil and gas-related jobs. However, total employment related to BLM-managed lands and direct BLM activities under Alternative C would increase over the planning period relative to current conditions and would be more than 1,000 jobs higher than under either Alternative A or B by the end of the planning period.

Table 4-225. Summary of Projected Direct/Indirect Employment Effects under Alternative C

Jobs*	Projections for Alternative C		Projected Differences Between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	10,968	11,169	189	390	-23	-34
Other mineral-related	3,460	4,152	1,384	2,076	0	0
Grazing-related	136	136	-1	-1	-1	-1
Recreation-related	104	116	12	24	0	0
BLM employment and spending-related*	NA	NA	NA	NA	NA	NA
Total jobs	***14,668***	***15,573***	***1,584***	***2,489***	***-24***	***-35***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

State and local tax revenues under Alternative C are projected to be approximately $200,000 less than under the No Action Alternative in year 10 of the planning period and approximately $400,000 per year less than under the No Action Alternative by the end of the planning period. State and local tax revenues are, however, projected to be larger under Alternative C than existing conditions. These effects are summarized in Table 4-226.

Table 4-226. Summary of Projected Direct/Indirect Effects on Annual State and Local Tax Revenues under Alternative C (millions of 2014 dollars)

Revenues	Projections for Alternative C		Projected Differences Between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$134.6	$137.4	$2.6	$5.3	-$0.2	-$0.4
Other mineral-related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing-related	$1.1	$1.1	$0.0	$0.0	$0.0	$0.0
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$171.9***	***$181.9***	***$17.1***	***$27.0***	***-$0.2***	***-$0.4***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Under Alternative C, annual federal revenues related to the CFO are projected to be approximately $400,000 to $500,000 lower than under the No Action Alternative. Federal revenues are projected to be greater under Alternative C than under existing conditions. These effects are summarized in Table 4-227.

Table 4-227. Summary of Projected Direct/Indirect Effects on Annual Federal Tax Revenues under Alternative C (millions of 2014 dollars)

Revenues	Projections for Alternative C		Projected Differences Between Alternative C and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$170.0	$173.2	$3.0	$6.1	-$0.4	-$0.5
Other mineral-related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing-related	$1.1	$1.1	$0.0	$0.0	$0.0	$0.0
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$231.0***	***$246.2***	***$27.0***	***$42.0***	***-$0.4***	***-$0.5***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative C would provide less protection for non-market values than Alternatives A or B, but more protection than Alternative D or the No Action Alternative.

Projected Economic Effects under Alternative D

Table 4-228 summarizes projected employment directly and indirectly related to activities on BLM-managed lands, as well as BLM direct employment and expenditures, under Alternative D. BLM employment and expenditures are budget constrained and are projected to remain the same under any of the alternatives.

Alternative D is projected to support approximately 96 more jobs by the tenth year of the planning period than the No Action Alternative and approximately 142 more jobs by the end of the 20-year planning period. Alternative D is the only action alternative projected to support more total employment than the No Action Alternative.

Table 4-228. Summary of Projected Direct/Indirect Employment Effects under Alternative D

Jobs	Projections for Alternative D		Projected Differences Between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	11,086	11,345	308	567	96	142
Other mineral-related	3,460	4,152	1,384	2,076	0	0
Grazing-related	137	137	0	0	0	0
Recreation-related	104	116	12	24	0	0
BLM employment and spending-related*	NA	NA	NA	NA	NA	NA
Total jobs	***14,787***	***15,750***	***1,704***	***2,667***	***96***	***142***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
* BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative D would also produce the most state and local tax revenue among the alternatives. State and local tax revenues under Alternative D are projected to be approximately $1.0 million more than under the No Action Alternative in year 10 of the planning period and approximately $1.6 million per year more than under the No Action Alternative by the end of the planning period. These effects are summarized in Table 4-229.

Table 4-229. Summary of Projected Direct/Indirect Effects on Annual State and Local Tax Revenues under Alternative D (millions of 2014 dollars)

Revenues	Projections for Alternative D		Projected Differences Between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$135.8	$139.3	$3.8	$7.3	$1.0	$1.6
Other mineral-related	$36.2	$43.4	$14.5	$21.7	$0	$0
Grazing-related	$1.1	$1.1	$0.0	$0.0	$0.0	$0.0
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$173.1***	***$183.8***	***$18.3***	***$29.0***	***$1.0***	***$1.6***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Similarly, annual federal revenues related to the CFO are projected to be approximately $1.5 million more than under the No Action Alternative by year 10 of the planning period and about $2.2 million per year more than the No Action Alternative by the end of the planning period. These effects are summarized in Table 4-230.

Table 4-230. Summary of Projected Direct/Indirect Effects on Annual Federal Tax Revenues under Alternative D (millions of 2014 dollars)

Revenues	Projections for Alternative D		Projected Differences Between Alternative D and Existing Conditions		Projected Differences from No Action Alternative	
	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20	Planning Year 10	Planning Year 20
Oil and gas-related	$171.9	$175.9	$4.8	$8.9	$1.5	$2.2
Other mineral-related	$59.9	$71.9	$24.0	$35.9	$0	$0
Grazing-related	$1.1	$1.1	$0.00	$0.00	$0.0	$0.0
Recreation-related*	NA	NA	NA	NA	NA	NA
BLM employment and spending-related†	NA	NA	NA	NA	NA	NA
Total revenue	***$232.9***	***$248.9***	***$28.8***	***$44.8***	***$1.5***	***$2.2***

Note: Data include direct effects and secondary regional economic effects estimated using IMPLAN.
*Recreation fiscal effects not available as described in assumptions at the beginning of this section.
† BLM employment and spending are driven by federal budgetary decisions independent of the management alternatives.

Alternative D would provide the least protection for non-market values among the action alternatives.

4.5.2.3 Social Direct/Indirect Impacts

4.5.2.3.1 Projected Effects on SESA Demographics and Demand for Public Services

Potential effects on SESA demographics from the management alternatives were estimated based on the total employment effects described in the preceding section combined with the ratios of key demographic metrics to total employment identified in the Methods and Assumptions discussion near the beginning of this section.

Demographic and Public Service Effects from the No Action Alternative

To facilitate comparisons to current SESA demographic conditions described in Chapter 3 and assessment of effects on demand for housing, schools, and other public services, the demographic effects of each alternative are presented in terms of changes from current conditions. Table 4-231 summarizes the projected effects of the No Action Alternative on key SESA demographic metrics.

Table 4-231. Summary of Projected Demographic Effects under the No Action Alternative

Direct/Indirect Effects	Projected Changes from Current Conditions	
	Planning Year 10	Planning Year 20
New jobs*	1,608	2,524
New residents	3,055	4,796
New households	1,091	1,713
New school children	611	959

*Includes direct effects and secondary regional economic effects described earlier in this section.

As described in greater detail in Chapter 3, the SESA had a total population of over 184,000 residents in 2010. The employment growth projected to occur over the 20-year planning period due to activities on BLM-managed lands under the No Action Alternative would lead to an increase in population of about 4,800 residents, equivalent to less than 3% of the 2010 total population. Consequently, this level of population growth would be considered a minor demographic effect. Whether the effect is considered beneficial or adverse is largely a matter of perspective.

Employment growth under the No Action Alternative would also lead to demand for over 1,700 housing units. As described in Chapter 3, there were approximately 7,800 vacant housing units in the SESA in 2010. Although the housing market in the SESA may have tightened since 2010 (as it has across most of the nation), it appears likely that the SESA could accommodate the increase in housing demand under the No Action Alternative over the 20-year planning period without too much difficulty. In some other parts of the western United States, including the Williston Basin in North Dakota and Montana, intensive oil and gas drilling activity has led to strong demand for short-term accommodations such as motel rooms, RV spaces and campgrounds. Under the No Action Alternative, however, the rate of drilling activity is projected to continue at the same pace as experienced in recent years under existing conditions. The projected increase in demand for housing over time under this alternative is due primarily to increases in the number of relatively permanent jobs required to maintain the increasing number of existing oil and gas wells and to the projected development of additional potash mines.

Similarly, the 959 new school-aged children anticipated under the No Action Alternative would represent less than a 3% increase in the number of school-aged children in the SESA in 2010. Given the length of the planning period during which this growth would occur, the increase in school-aged children would again represent a minor increase in demand for public education services.

Demographic and Public Service Effects from Alternative A

Table 4-232 summarizes the projected effects of Alternative A on key SESA demographic metrics.

Table 4-232. Summary of Projected Demographic Effects under Alternative A

Direct/Indirect Effects	Projected Changes from Current Conditions	
	Planning Year 10	Planning Year 20
New jobs*	802	1,333
New residents	1,523	2,533
New households	544	905
New school children	305	507

*Includes direct effects and secondary regional economic effects described earlier in this section.

The employment growth projected to occur over the 20-year planning period due to activities on CFO-managed lands under Alternative A would lead to an increase in population of about 2,500 residents, equivalent to less than 2% of the 2010 total population. This relative level of population growth over the 20-year planning period would likely constitute a minor demographic effect.

Employment growth under Alternative A would also lead to demand for about 900 housing units. Over a 20-year period, this would again represent a relatively minor increase in housing demand.

The 507 new school-aged children anticipated over the next 20 years under Alternative A would represent less than a 2% increase in the number of school-aged children in the SESA in 2010. The increase in school-aged children would again represent a minor increase in demand for public education services.

Demographic and Public Service Effects from Alternative B

Table 4-233 summarizes the projected effects of Alternative B on key SESA demographic metrics.

Table 4-233. Summary of Projected Demographic Effects under Alternative B

Direct/Indirect Effects	Projected Changes from Current Conditions	
	Planning Year 10	Planning Year 20
New jobs*	293	571
New residents	557	1,086
New households	199	388
New school children	111	217

*Includes direct effects and secondary regional economic effects described earlier in this section.

Alternative B's effects on the SESA population are smaller than the projected effects under Alternative A. This relative level of population growth over the 20-year planning period would be a minor demographic effect.

Employment growth under Alternative B would lead to demand for about 400 housing units, about 500 fewer units than under Alternative A. Over a 20-year period, this would again represent a relatively minor increase in housing demand.

The 217 new school-aged children anticipated under Alternative B would represent less than a 1% increase compared to the number of school-aged children in the SESA in 2010. This would represent a minor increase in demand for public education services.

Demographic and Public Service Effects from Alternative C

Table 4-234 summarizes the projected effects of Alternative C on key SESA demographic metrics.

Table 4-234. Summary of Projected Demographic Effects under Alternative C

Direct/Indirect Effects	Projected Changes from Current Conditions	
	Planning Year 10	Planning Year 20
New jobs*	1,584	2,489
New residents	3,010	4,729
New households	1,075	1,689
New school children	602	946

*Includes direct effects and secondary regional economic effects described earlier in this section.

Alternative C would have larger effects on the SESA population than Alternative A or Alternative B, but smaller effects than under the No Action Alternative. Once again, the projected increase in population due to activities on BLM-managed lands would represent a minor demographic effect over the 20-year planning period.

Employment growth under Alternative C would lead to demand for about 1,700 housing units, slightly less than under the No Action Alternative. This would again represent a relatively minor increase in housing demand over the 20-year period.

The increase in demand for public education of 946 additional school-aged children by the end of the 20-year planning period is similar to the projected effect under the No Action Alternative and represents a minor increase in demand for public education services.

Demographic and Public Service Effects from Alternative D

Table 4-235 summarizes the projected effects of Alternative D on key SESA demographic metrics.

Table 4-235. Summary of Projected Demographic Effects under Alternative D

Direct/Indirect Effects	Projected Changes from Current Conditions	
	Planning Year 10	Planning Year 20
New jobs*	1,704	2,666
New residents	3,237	5,066
New households	1,156	1,809
New school children	647	1,013

*Includes direct effects and secondary regional economic effects described earlier in this section.

Alternative D would have the largest effect on the SESA population of any of the alternatives. However, the nearly 5,100 new residents projected to live in the SESA due to activities on BLM-managed lands would still represent a minor demographic effect over the 20-year planning period and would be less than 3% of the 2010 population of the area.

Employment growth under Alternative D would lead to demand for over 1,800 housing units, more than under the No Action Alternative. This would again represent a negligible increase in housing demand over the 20-year period.

The increase in demand for public education of 1,013 additional school-aged children by the end of the 20-year planning period is slightly larger than the projected effect under the No Action Alternative and again represents a minor increase in demand for public education services given the length of the planning period.

4.5.2.3.2 Other Social Effects

The social effects of rapid development of natural gas, oil, coal, power plants and other energy, and extractive resources have been studied by sociologists and others for nearly 40 years. Most recently, the energy “booms” in areas such as the Williston Basin in North Dakota and the Marcellus Shale in Pennsylvania have spurred a number of studies regarding social effects on small communities experiencing

rapid development (North Dakota State University 2011; Brasier and Kelsey 2012; Montana All Threat Intelligence Center and North Dakota State and Local Intelligence Center 2012; Montana Board of Crime Control 2013).

After more than 40 years of study in various locations, the potential social impacts arising from rapid natural resource development are widely recognized. Such effects can include changes in how residents perceive their lives and their community, including:

- Changes in the density of acquaintanceship (see Freudenberg 1986 for example). This may sometimes be expressed in statements like "we used to know everyone, now there are a lot of strangers in our community."
- Declines in local identity, solidarity, and trust in other community members (see Greider et al. 1991).
- Fear of crime (see Krannich et al. 1985).
- Less control of deviant behavior, reduced respect for law and order, and less effective socialization of youth (see Freudenberg 1986).
- Diminished community satisfaction and reduced attachment to the community (see Brown et al. 1989).

These effects can vary based on both the nature of the resource activity and the existing characteristics of the affected communities. In general, the pace of development, the stage of development, and the prior experience of the community with natural resource and extractive industry appear to be important determinants of the nature and magnitude of social impacts (Montana Board of Crime Control 2013).

The residents and communities in the SESA have extensive experience with energy development and other extractive industries, as described in Chapter 3. Projected development of oil and gas and other mineral resources under any of the proposed alternatives would not represent a substantial change from the type or pace of development that the area has experienced over at least the past decade. Consequently, the probability of the residents of the SESA experiencing the types of "boomtown" social effects that have occurred in smaller communities with little previous experience with rapid industrial development appears to be low under any of the proposed alternatives.

In the Analysis of the Management Situation developed near the beginning of this RMP process, four general groups were identified based on varied perspectives on the use and management of public lands within the SESA. These groups included ranchers, recreationists, individuals who prioritize natural resource uses and individuals who prioritize resource protection. The four groups are not necessarily mutually exclusive and individuals residing in the SESA (or elsewhere) may align with more than one group, or even align differently depending on the particular issue in question. However, this simple structure provides a useful way to consider the effects on different interests from the CFO management alternatives. The following discussion focuses on how each of these groups may perceive and be affected by the various management alternatives.

Other Social Effects from the No Action Alternative

Effects on Ranchers

The No Action Alternative would largely maintain the status quo in terms of grazing use of BLM-managed lands. The potential for conflicts with other uses and users of the public lands is likely to gradually increase as both oil and gas and recreation uses increase over the 20-year planning period.

Effects on Recreationists

The No Action Alternative would also largely maintain the status quo in terms of recreation use. Relative to the action alternatives, this alternative may be perceived as the most favorable by current OHV users because it creates the fewest restrictions on off-highway travel. Conflicts between OHV users and non-motorized recreationists would likely increase over the planning period as recreation activity levels continue to grow. Conflicts between all types of recreationists and other users of the lands are likely to gradually increase as both oil and gas and recreation uses increase over the 20-year planning period.

Effects on Individuals Who Prioritize Natural Resource Uses

The No Action Alternative, along with Alternative D, is likely to be perceived as the most favorable alternatives among individuals that prioritize natural resource development on public lands. The No Action Alternative would allow nearly as much oil and gas development as Alternative D, but also involves the least change in BLM management policies from the status quo. Changes in management policies and regulation require adaptation and can create uncertainty from an industry perspective.

Effects on Individuals Who Prioritize Resource Protection

The interests of individuals that place their highest priority on protecting resources and the environment may be most closely aligned with the alternatives that would offer the most protection for non-market economic values. Since the No Action Alternative likely provides the least protection for these values, it would likely be the least favorable alternative for this community.

Other Social Effects from Alternative A

Effects on Ranchers

Alternative A would reduce the number of AUMs available for grazing and would reallocate increased vegetation from restoration efforts away from grazing use. Although this alternative could also reduce the potential for conflicts with other users of public lands over the planning period, ranchers and livestock producers may perceive Alternative A as having an adverse impact on their abilities to maintain current stocking levels.

Effects on Recreationists

OHV recreational users would benefit from the designation of the Alkali Lake SRMA while designations of SRMAs at Conoco Lake and La Cueva would benefit non-mechanized recreationists. Square Lake would be designated as an ERMA, with long-term beneficial effects for OHV users.

Effects on Individuals Who Prioritize Natural Resource Uses

Alternative A, is likely to be perceived as one of the least favorable alternatives among individuals that prioritize natural resource development on public lands. Alternative A provides a greater emphasis on resource protection relative to resource development, and may consequently be seen as having a negative effect on resource use options by these individuals.

Effects on Individuals Who Prioritize Resource Protection

Alternative A provides the highest level of resource protection among the options being considered in this RMP. Alternative A would protect and enhance multiple ecosystems, and would probably enhance non-market values associated with BLM-managed lands. Consequently, Alternative A is likely to be perceived as a beneficial and preferred alternative by these individuals.

Other Social Effects from Alternative B

Effects on Ranchers

Alternative B would reduce the number of AUMs available for grazing compared to the No Action Alternative or Alternative A. However, Alternative B would allocate a portion of increased vegetation from restoration efforts, and a portion of suspended or inactive AUMs to grazing use (with the rest being allocated to other purposes). Like Alternative A, this alternative could also reduce the potential for conflicts with other users of the lands over the planning period, but it is likely that ranchers and livestock producers would perceive Alternative B as having a negative effect on their ability to maintain stocking rates and, consequently, production levels.

Effects on Recreationists

Individuals prioritizing recreational uses would benefit from additional recreation management under Alternative B. Equestrian users, in particular, would benefit from the designation of the Pecos River Equestrian area and Hay Hollow Equestrian area as ERMAs.

Effects on Individuals Who Prioritize Natural Resource Uses

Alternative B is likely to be perceived as the least favorable alternative by this group. Like Alternative A, this alternative places more emphasis on resource protection than resource development and is likely to be seen as an adverse option by this group.

Effects on Individuals Who Prioritize Resource Protection

Alternative B, together with Alternative A, provides the highest level of resource protection among the options being considered in this RMP. Alternative B would protect and enhance non-market values associated with BLM-managed lands and is likely to be seen as a beneficial option by this group.

Other Social Effects from Alternative C

Effects on Ranchers

Alternative C would allow more grazing than any of the other alternatives, including the No Action Alternative. This alternative could also somewhat reduce the potential for conflicts with other users of BLM-managed lands, particularly relative to the No Action Alternative. Alternative C could be perceived as providing a minor benefit to this group, relative to the No Action Alternative, and would likely be perceived as substantially beneficial relative to Alternative A or Alternative B.

Effects on Recreationists

Individuals who prioritize recreational uses of BLM-managed lands would likely perceive Alternative C to be less beneficial than Alternative B, but more beneficial than the No Action Alternative. Alkali Lake would be designated as an ERMA, rather than a SRMA, and the Hay Hollow Equestrian area would not receive a designation.

Effects on Individuals Who Prioritize Natural Resource Uses

Alternative C attempts to balance natural resource development with resource protection. As such, this alternative is likely to be perceived as more favorable than Alternative A or B, and less favorable than the No Action Alternative or Alternative D by this group.

Effects on Individuals Who Prioritize Resource Protection

For the same reasons just described, Alternative C is likely to be seen as a more favorable option (or providing at least a minor benefit) than Alternative D or the No Action Alternative by individuals that prioritize resource protection. Alternative C would likely be considered less favorable than Alternative A or B by this group.

Other Social Effects from Alternative D

Effects on Ranchers

Alternative D would make approximately the same amount of grazing land available as Alternative C, with slightly fewer permitted AUMs. This alternative could also somewhat reduce the potential for conflicts with other users of BLM-managed lands, particularly relative to the No Action Alternative. Alternative D, like Alternative C, could be perceived as providing a minor benefit to this group, relative to the No Action Alternative. Alternative D would likely be perceived as substantially beneficial relative to Alternative A or Alternative B.

Effects on Recreationists

Alternative D would likely be perceived as the last beneficial action alternative by those who prioritize recreational use of BLM-managed lands**.** Fewer areas would be designated as SRMAs or ERMAs and actively managed to for recreational purposes than under the other action alternatives.

Effects on Individuals Who Prioritize Natural Resource Uses

Alternative D provides the most emphasis on natural resource development among all of the alternatives. As such, this alternative is likely to be perceived as the most favorable option by this group.

Effects on Individuals Who Prioritize Resource Protection

Alternative D is likely to be seen as the worst management alternative among individuals that prioritize resource protection.

4.5.2.4 Environmental Justice

EO 12898, dated February 11, 1994, established the requirement to address environmental justice concerns within the context of federal agency operations. Fundamental principles of environmental justice require that federal agencies:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations;
- Ensure the full and fair participation by all potentially affected communities in the decision-making process; and
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits of the project by minority and low-income populations.

Evaluation of environmental justice impacts requires identification of minority and low-income populations (including Native American tribes) within the SESA and evaluation of the potential for the alternatives to have disproportionately high and adverse impacts on such populations.

As described in Chapter 3, the SESA as a whole has a high percentage of minority residents, most of whom are Hispanic. The communities of Roswell, Dexter, Hagerman, Lake Arthur, Artesia, Loving, Hobbs, Lovington, and Jal all have minority populations over 50% and are considered “minority population areas” under environmental justice standards. Other potential environmental justice populations, determined by low-income status, are Hagerman, Roswell, Artesia, and Loving.

In general, and to varying degrees as described earlier in this section, each of the alternatives would allow for continuing economic and population growth in the SESA due to activities on BLM-managed lands. Employment growth, in particular, can provide additional economic opportunities for low-income residents. Rapid employment and population growth, however, can also present challenges for low-income residents (particularly the unemployed) due to increases in housing costs and household commodity prices that may accompany this type of economic expansion. As described in the preceding discussions regarding projected demographic and social effects, none of the alternatives considered in this RMP/EIS are projected to lead to substantial or sudden increases in the rate of economic or demographic growth in the SESA.

RMP alternatives, such as those evaluated in this EIS, are challenging to evaluate in terms of more geographically specific environmental justice concerns. RMPs reflect resource planning and management at the landscape scale and generally do not prescribe or evaluate specific locations of future activities that could affect the most closely proximate communities. To the extent that nearby residents may be disproportionately adversely affected by the environmental impacts of industrial developments, such as oil and gas drilling or potash mining (e.g., additional truck traffic, reduced air quality, additional noise, and visual impacts), there is more potential risk of disproportionate adverse effects on minority or low-income communities under the alternatives that would make the most land available for such development—Alternatives C and D—than under the alternatives that would emphasize the protection of natural resources—Alternative A and Alternative B. The No Action Alternative would fall in the middle of the five

alternatives. Should specific industrial developments be proposed under any alternative in the future, further assessment of impacts to environmental justice populations will be part of the compliance and permitting processes at that time. Without being able to forecast the specific locations of future industrial activities that may occur under any of the alternatives, the BLM CFO concludes that none of the alternatives described in this document are likely to result in disproportionate adverse impacts to environmental justice populations identified within the SESA.

4.5.3 Health and Safety

4.5.3.1 Analysis Methods

Section 3.5.3, Health and Safety, identifies authorized activities and uses of public lands that have inherent and recognized risks. These activities and uses include motorized vehicle use, recreational activities, energy development, authorized use of hazardous materials, and the presence of physical hazards (including abandoned mine land [AML] sites). Management actions detailed in Chapter 2 that are identified to have impacts to health and safety are discussed as causing an increase or decrease to the risks associated with these activities and uses. The BLM's Manual 1703-1 Hazard Management and Resource Restoration (2009) provides management guidance with regard to BLM's responsibilities to maintain and protect public health.

4.5.3.1.1 Methods and Assumptions

Management actions related to the following resource areas were analyzed in detail: public safety, recreation, travel management, minerals, wildland fire and fuels, and special designations. Management actions related to the following resources and resource uses are not expected to either increase or decrease risks associated with the activities and uses identified above and in Chapter 3 and are therefore not analyzed in detail below: air resources, soils, water, karst, vegetative communities, fish and wildlife, special status species, noxious weeds and invasive species, cultural resources, paleontological resources, lands with wilderness characteristics, visual resources, renewable energy, livestock grazing, land use authorizations and land tenure, and social and economic conditions.

The BLM identified the following analysis assumptions related to the impacts discussion:

- The BLM assumes all ATV users would follow manufacturer recommended safety guidelines, as well as all state laws, and adhere to all warning signs.
- The BLM assumes all oil and gas or mining industry personnel working on BLM-administered lands would follow all safety procedures and guidelines as regulated by OSHA, USDI Safety & Health Handbook 485 DM, BLM Manual 1703-1, and BLM Manual Handbook H 1112-2.
- The BLM assumes oil and gas operators would disclose all hazardous materials or wastes used for operations, and that all federal, state, and local regulations regarding use of hazardous materials would be adhered to.

4.5.3.2 Direct and Indirect Impacts

4.5.3.2.1 Impacts of Health and Safety Actions

Section 3.5.3, Health and Safety, identifies H_2S as a safety issue in the planning area because of the associated risks of exposure to the public. Chapter 2 includes management common to all alternatives related to H_2S, as well as proposed management common to all action alternatives. No management is proposed that varies across alternatives. Therefore, only management common to all and management common to all action alternatives are discussed below.

Impacts from Management Common to All

Following hazardous materials management requirements described in BLM Manual 1703-1 and BLM Manual Handbook 1112-2, Chapter 28, Toxic and Explosive Gas Protection, is applicable to all alternatives. Following these requirements reduces risk of contamination of air, soil, or water from a leak or spill of

hazardous materials by requiring remediation of contaminated sites and restoring natural resources injured by releases of hazardous substances and petroleum products.

Impacts from Management Common to All Action Alternatives

Under all action alternatives the BLM would develop a BLM employee database and use the Safety Management Information System database to track the occurrence of H_2S monitor incidents. This would decrease future risk to BLM employees and others that may be in the vicinity of wells with H_2S exposure risk by collecting data and mapping certain areas where H_2S often occurs. Collection of information regarding H_2S monitor incidents would allow the BLM to warn potential users of H_2S occurrences, which would decrease the risk from exposure to H_2S.

4.5.3.2.2 Impacts of Recreation Actions on Health and Safety

As discussed in Section 3.5.3, Health and Safety, authorized recreational uses of BLM-administered lands include caving, horseback riding, biking, hiking, rock climbing, camping, and OHV use. Recreational shooting, other than hunting, is not a sanctioned use of public lands. The primary issues with safety and recreational users are conflicts between OHV riders within designated areas and oil and gas development in the form of aboveground pipelines and potential exposure to H_2S near recreational areas. Chapter 2 identifies current management designed to reduce these conflicts that would be brought forward under all action alternatives and is analyzed under management common to all below. No new management is proposed under the action alternatives specific to health and safety, and therefore only management common to all is discussed below.

Impacts from Management Common to All

Under all alternatives the BLM would manage the OHV high-use areas Alkali Lake ERMA, Hackberry Lake SRMA, Dunes RMZ, and Trails RMZ to continue to reduce conflicts with energy development and other users by requiring flags on OHVs, posting signage wherever H_2S might occur, and requiring all pipelines be buried. Current trends show that OHV-user conflicts with current and future energy development, will continue.

4.5.3.2.3 Impacts of Travel Management Actions on Health and Safety

Section 3.5.3, Health and Safety, identifies OHV use and the trend of increasing OHV use as a safety issue for the planning area. Travel management decisions from Chapter 2 include designating areas in one of two categories: limited, or closed to motorized travel. This analysis uses the assumption that cross-country travel is more risky for OHV riders than travel on existing or designated routes because of the presence of physical hazards such as aboveground pipelines, dips in topography, AML sites, illegal waste sites, existing oil and gas facilities, and other physical hazards. Therefore, the greater the acres closed to overland travel corresponds to a reduced overall risk to OHV riders. Table 4-236 identifies the travel management designations across alternatives. The travel management designations vary by alternative and the different impacts are described below.

Table 4-236. Travel Management Designations in Acres by Alternative

Management	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Limited	2,035,307	2,039,299	2,049,391	2,052,582	2,052,584
Closed	55,966	52,028	41,936	38,738	38,737
Total	***2,091,273***	***2,091,326***	***2,091,327***	***2,091,320***	***2,091,321***

Impacts from the No Action Alternative

Under the No Action Alternative, 2,035,307 (97% of BLM-administered lands in the planning area) would be managed as OHV limited; the remaining acreage would be closed to motorized travel. Current trends regarding conflicts between OHVs and other uses/users detailed above and in Chapter 3 would continue.

Impacts from Alternative A

Under Alternative A, 2,039,299 (98% of BLM-administered lands in the planning area) would be managed as OHV limited. Current trends regarding conflicts between OHVs and other uses/users detailed above and in Chapter 3 would continue. Safety risks and conflicts with other uses associated with OHV travel would be similar to the No Action Alternative.

Impacts from Alternative B

Under Alternative B, 2, 2,049,391 (98% of BLM-administered lands in the planning area) would be managed as OHV limited. This would increase the potential for user conflict and safety risks slightly as compared to the No Action Alternative.

Impacts from Alternative C

Under Alternative C, 2,052,582 (98% of BLM-administered lands in the planning area) would be managed as OHV limited. This would increase the potential for user conflict and safety risks slightly as compared to the No Action Alternative.

Impacts from Alternative D

Under Alternative D, 2,052,584 (98% of BLM-administered lands in the planning area) would be managed as OHV limited. This would increase the potential for user conflict and safety risks slightly as compared to the No Action Alternative.

4.5.3.2.4 Impacts of Minerals Actions on Health and Safety

Section 3.5.3, Health and Safety, identifies oil and gas exploration, potash mining, and hazardous materials used in oil and gas development and potash mining as safety issues in the planning area. In addition, transportation related to mineral extraction activities is a safety concern because of risk to the public from traffic accidents. Mineral development decisions from Chapter 2 include actions that may increase or decrease risks to health and safety from activities and uses. The discussion details impacts from the following activities and uses:

- Oil and gas exploration
  - well drilling and operations
  - installation and operation of pressurized pipelines
  - authorized use of hazardous materials
  - industrial traffic on area highways
  - presence of H_2S
- Potash mining
- Remediation of abandoned mine sites

Oil and Gas Exploration

Well drilling and operation, and installation of transport and connection pipelines and pipeline facilities, such as compressor stations, are predicted to continue in the planning area and in some areas may increase. Well drilling requires the use of hazardous materials and associated pipelines carry hazardous materials and have potential for leaks or ruptures, which can pose safety and environmental risks. In addition, in some areas, H_2S is prevalent and risk of exposure to H_2S must be managed. In addition, oil and gas exploration requires the use of industrial truck traffic, which increases the risk of accidents on area highways. In this analysis the assumption is made that the greater the number of acres potentially disturbed for energy development over the term of the RMP (20 years) correlates to the potential risks to health and safety from the use of hazardous materials and the use of truck traffic associated with those activities. Potential impacts from any spills or releases would be adverse and long term. Predicted levels of oil and gas development and associated surface disturbance vary across alternatives, and the analysis by alternative is presented below. Table 4-237 compares the total predicted surface disturbance for oil and gas development by alternative, after reclamation.

Table 4-237. Potential Surface Disturbance in Acres, on BLM-administered Lands, by Alternative

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
8,636	6,565	5,202	8,575	8,887

Impacts from Management Common to All

Under all of the alternatives the BLM would require adherence to hazardous materials management practices for protection of public health and safety. The operators installing and operating oil and gas wells, facilities, and pipelines would be responsible for complying with the applicable laws and regulations governing hazardous materials and following all hazardous spill response plans and stipulations. These requirements would provide a detailed strategy and process for responding to releases of hazardous substances, therefore reducing short-term impacts from contamination. The CFO routinely inspects and monitors these operations to ensure operator compliance. Compliance with, and BLM enforcement of, federal and state requirements would continue current trends with regard to the potential risk of and impacts to health and safety from leaks or spills of hazardous materials.

For management of risks related to H_2S exposure, all alternatives include measures to flare or vent gas and require the use of stock tank vapor recovery systems. These measures would continue current trends with regard to the risks of potential for explosions or settling of gas in caves or low-lying areas and risk of human contact with H_2S.

Impacts from the No Action Alternative

Under the No Action Alternative, 8,636 acres would be disturbed by future oil and gas development. Current trends regarding uses of hazardous materials and potential for leaks or spills and risks related to traffic accidents would continue.

Impacts from Alternative A

Under Alternative A, 6,565 acres would be disturbed by oil and gas development. This is approximately 24% less disturbance than the No Action Alternative. Potential risks related to release of hazardous materials, traffic accidents, and conflicts with other uses would also be reduced.

Impacts from Alternative B

Under Alternative B, 5,202 acres would be disturbed by oil and gas development. This is approximately 40% less disturbance than the No Action Alternative. Potential risks related to the release of hazardous materials, traffic accidents, and conflicts with other uses would also be reduced.

Impacts from Alternative C

Under Alternative C, 8,575 acres would be disturbed by oil and gas development. This is very similar to the predicted disturbance under the No Action Alternative. Potential risks related to release of hazardous materials, traffic accidents, and conflicts with other uses would be similar to the No Action Alternative.

Impacts from Alternative D

Under Alternative D, 8,887 acres would be disturbed by oil and gas development. This is approximately 3% more disturbance than the No Action Alternative. Potential risks related to release of hazardous materials, traffic accidents, and conflicts with other uses would increase.

Potash Mining

Potash mining in the planning area is expected to increase over the life of the RMP as the demand of fertilizer-based products increases. Safety issues related to potash mining are primarily when mining and oil and gas operations conflict. Conflicts between oil and gas and mining are mainly the risk of harm to mine workers from migration of gas or hazardous materials, including H_2S, into mines. Mining also utilizes

hazardous materials with associated potential for leaks and spills. Management actions related to safety issues and potash mining do not vary across alternatives; therefore, only impacts from management common to all are discussed.

Impacts from Management Common to All

All exploration and operations activities in the Secretary's Potash Area authorized on BLM-administered lands are required to comply with the Secretarial Order for Co-Development of Oil & Gas and Potash Resources in Southeast New Mexico. This secretarial order includes measures to prevent the infiltration of oil, gas, or water in formations containing potash deposits or into mines or workings being utilized in the extraction of such deposits. Adhering to these measures would reduce risk of harm to workers and reduce potential for migration of hazardous materials into mine cavities. Similar to oil and gas operators, mine operations are also subject to BLM inspections and MSHA regulations for worker and mine safety. In addition, operators must adhere to Mine Safety and Health Administration safety standards for active mines for all safety related to mining activities on CFO-administered lands. Adherence to these safety regulations continues current trends related to health and safety risks to mine workers.

Remediation of Abandoned Mine Sites

Section 3.5.3, Health and Safety, details the risks and hazards associated with abandoned mine sites on public lands. The BLM's AML program seeks to reduce or eliminate the effects of past hard rock mining in order to enhance public safety and improve water quality. Management actions related to AML sites are contained in Chapter 2 and do not vary across action alternatives; therefore, only impacts from management common to all action alternatives are discussed below. No corresponding action exists under the No Action Alternative.

Impacts from Management Common to All Action Alternatives

Under all action alternatives, the BLM would coordinate with the New Mexico Abandoned Mine Programs and follow federal AML regulations, etc., to continue to locate, inventory, and close abandoned mines. These measures would reduce risk to the public by posting warning signs at any unstable AML sites and closing and remediating AML sites when funding is available.

4.5.3.2.5 Impacts of Wildland Fire and Fuels Management Actions on Health and Safety

Section 3.5.3, Health and Safety, identifies the risks to life and property from wildfires. The BLM seeks to reduce risks to life and property from the spread of wildfire through fire management and emergency response planning. Management of wildfire prevention and response is detailed in Chapter 2. Those actions related to health and safety and preservation of life and property do not vary across alternatives; therefore, only management common to all alternatives is discussed below.

Impacts from Management Common to All

Under all alternatives the BLM would update and amend the CFO FMP (BLM 2010), as necessary, to prioritize firefighter and public safety during wildfire response actions or approved prescribed burn actions. The BLM would work together with other fire management agencies such as federal, state, and local agencies to maintain community wildfire protection plans that include risk reduction implementation plans. These measures would continue to manage risks to life and property from wildfire on public lands by fostering communication among agencies and updating methods and responses to wildfire as previous methods and plans become outdated.

4.5.3.2.6 Impacts of Special Designations Actions on Health and Safety

During the RMP process the BLM seeks to designate ACECs that have recognized relevant and important values, such as cultural, scenic, wildlife, and natural processes and hazards, as well as provide management for WSRs and WSAs. Those areas specifically designated for recreational use are discussed above (see Impacts of Recreation Actions on Health and Safety). During the internal evaluation of ACECs,

the BLM identified four proposed ACECs that possess the relevant and important criteria of natural hazards in the form of undeveloped caves (Table 4-238). All undeveloped caves contain some hazards, such as total darkness, loose rocks, low ceilings, low tight passages, slippery surfaces, and steep, unstable, and uneven floors.

Table 4-238. Area of Critical Environmental Concern Designations with Identified Natural Hazards by Alternative

ACEC	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Carlsbad Chihuahuan Desert Rivers		X			
Cave Resources		X	X	X	X
Gypsum Soils			X	X	
Seven Rivers Hills			X	X	X

Note: ACECs proposed under each alternative are designated by an "X."

The BLM action of creating designated areas can encourage or promote visitation of these areas by highlighting the amenities of scenery, remoteness, primitive recreational opportunities, caving, or other activities. The primary risks to health and safety related to visitation of ACECs, WSRs, lands with wilderness characteristics, and WSAs are hazards of visiting remote areas where communications and emergency services are far away or unavailable, and where hostile wildlife, and natural physical hazards such as steep topography, unstable areas, and caving hazards mentioned above exist.

The BLM seeks to reduce recognized risks to visitors by reducing conflicts between visitors and other uses, such as oil and gas development, and by recognizing and warning the public regarding natural hazards found in some designated areas. Through the designation process, the BLM can manage visitor and other uses accordingly. The action of evaluating and designating certain areas for special management reduces risks to the public by publicizing where hazards occur and what type of risks are present, and by requiring adherence to rules and guidelines meant to protect the public from potential harm.

Impacts from the No Action Alternative

Under the No Action Alternative, the proposed ACECs recognized to possess natural hazards would not be managed to protect health and safety through ACEC designation. Current trends regarding visitor use of these areas and potential risk to visitors would continue.

Impacts from Alternative A

Under Alternative A, two ACECs with recognized natural hazards would be designated, Carlsbad Chihuahuan Desert Rivers and Cave Resources. Potential risks to health and safety related to visitation of these areas would be reduced by the adoption of the following management prescriptions by limiting visitor use and publicizing dangers from natural hazards:

- Limit camping to designated areas (Carlsbad Chihuahuan Desert Rivers ACEC).
- Develop a comprehensive ACEC management plan to direct the management of cave visitor use, scientific research, and other cave related projects (all units of Cave Resources ACEC).

Impacts from Alternative B and C

Under Alternative B and C, three ACECs with recognized natural hazards would be designated, Cave Resources, Gypsum Soils, and Seven Rivers Hills. Potential risks to health and safety related to visitation of these areas would be reduced by the adoption of the following management prescriptions by limiting visitor use and publicizing dangers from natural hazards:

- Develop a comprehensive ACEC management plan to direct the management of cave visitor use, scientific research, and other cave related projects (all units of Cave Resources ACEC).
- Limit camping to designated areas (Gypsum Soils ACEC).
- Complete limited OHV designation and implement plan to restrict vehicles to designated routes. Close the route(s) over sink holes. Default to the travel allocations and defer route designation to TMP (Seven Rivers Hills ACEC).

Impacts from Alternative D

Under Alternative D, two ACECs with recognized natural hazards would be designated, Cave Resources and Seven Rivers Hills. Potential risks to health and safety related to visitation of these areas would be reduced by the adoption of the following management prescriptions by limiting visitor use and publicizing dangers from natural hazards:

- Develop a comprehensive ACEC management plan to direct the management of cave visitor use, scientific research, and other cave related projects (all units of Cave Resources ACEC).
- Complete limited OHV designation and implement plan to restrict vehicles to designated routes. Close the route(s) over sink holes. Default to the travel allocations and defer route designation to the travel management plan (Seven Rivers Hills ACEC).

4.6 CUMULATIVE IMPACTS

Cumulative impacts occur when there are multiple impacts on the same resources. These are incremental impacts of proposed activities or projects when combined with past, present, and future actions. As stated in 40 CFR 1508.7 (1997), a "cumulative impact" is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. For the purposes of this analysis, the area considered for cumulative impacts is the 6.2-million-acre CFO planning area.

Resource decisions from this RMP could combine with other past, present, and reasonably foreseeable future actions to produce cumulative impacts to resources and resource uses within the planning area. Co-occurring planning projects in the region that could contribute to cumulative impacts include activities in the Lincoln National Forest, Carlsbad Caverns National Park, and Guadalupe Mountains National Park, as well as projects conducted by the Bureau of Reclamation, U.S. Department of Energy, and the BLM Roswell, Las Cruces, Oklahoma, and Amarillo Field Offices. Activities on state lands, private lands, and in city and county use plans for surrounding communities could have cumulative impacts where land is developed adjacent to BLM-administered lands.

Past actions that affected the resources in the planning area are reflected in Chapter 3 – Affected Environment. Impacts from past and present actions within the 6.2-million-acre planning area include approximately 317,000 acres of surface-disturbing activities, including past-construction of gas plants, potash mines, oil and gas well pads, access roads, transmission lines, and other linear features.

Reasonably foreseeable future actions are uses and activities that are planned to occur within the planning area in the foreseeable future. The RMP/EIS takes into account those proposed actions that are actively being proposed by other agencies, organizations, or governments that would impact resources within the planning area. The BLM considered those projects that were within the planning area and of sufficient scope to impact the resources discussed in this RMP at similar spatial and temporal scales as the direct and indirect impacts.

The following reasonably foreseeable actions were identified that may contribute cumulative impacts to the project. Reasonably foreseeable actions are planned or proposed, not speculative or in the distant future. They also include continuation of recent trends in use. The following actions are identified as reasonably foreseeable:

- land and resource management planning in the CFO planning area and surrounding adjacent areas;
- continued expansion of mineral extraction activities, including oil, gas, and potash, within the planning area and surrounding adjacent areas along with state and private lands;
- utility corridor development;
- pipeline and transmission line development;
- increases in motorized and non-motorized recreation use of BLM-administered lands;
- federal, state, and local fire plan activities;
- continued implementation of the *New Mexico Standards for Public Land Health and Guidelines for Livestock Grazing Management* (Standards and Guidelines), the BLM's 13 Western States Vegetation EIS, and Restore New Mexico;
- continued noxious weed infestations;
- continued wildfire management, including prescribed burning and natural ignitions;
- vegetation treatments and sagebrush restoration; and
- renewable energy development.

Specific reasonably foreseeable future actions for the CFO planning area are listed in Table 4-239.

Table 4-239. Reasonably Foreseeable Future Actions for Planning Area

Project Proponent	Brief Description	Footprint/Surface Disturbance
Intercontinental Potash Corporation (ICP) Ochoa Mine Project	The project includes 3,932 acres of surface disturbance for the processing plant, water well field, pipeline, and loadout facility. An estimated 1,842 acres of the processing plant is located within a lesser prairie-chicken management area.	3,932 acres
ICP	Same as above. The ROD was signed April 10, 2014. Total proposed new surface disturbance is expected to be 2,500 acres.	2,500 acres
Industrial Water Use	RFD projects include a number of wells that can also be used to make assumptions for water use. Water treatment facilities. EOG treatment facility all inclusive. Water use 38,943 acre-feet.	12,980 acres
Seismic projects	70 seismic projects.	32,500 acres[7] (short term); reclamation within 3 years
HB Amax Solution Mine Project	Potash production.	62 acres
Mosaic Tailings	Tailings storage.	1,405 acres
Fire and fuels treatments	Non-BLM agencies would treat up to 150,000 acres with prescribed fire, 20,000 acres with mechanical treatments, and 100,000 acres of herbicide over the next 20 years.	120,0000 acres
Land farms	27 land farms, including Maljamar land farm just west of Maljamar.	140 acres
Restore New Mexico	Vegetation restoration.	1 million acres treated and 1 million acres planned for the future
Frontier Energy Pipeline	A 200-mile (or 700 acres) crude oil gathering pipeline system.	700 acres
Amrad to Artesia Transmission Line	Transmission line.	787 acres
Xcel Transmission Grid	Based on corridor length of 251.4 miles at 30 feet wide. With 50-foot width it would be 1,524 acres.	915 acres
Enterprise Gas Pipeline	Gas pipeline.	267 acres
BOPCO Drill Islands Infrastructure	Drill islands infrastructure.	175 acres
Biofuel Project	Converting algae.	–
Hydraulic Fracturing sand projects	Rail line to deliver hydraulic fracturing sand to industry.	61 acres

[7] Average project area 6.500 acres and temporary disturbance for a year because of rolling of the equipment.

Project Proponent	Brief Description	Footprint/Surface Disturbance
Navitas	Midstream gas pipeline and plant.	420 acres
Xcel Energy	Hobbs to China Draw power line.	300 acres
Sunoco Pipeline	Oil pipeline.	175 acres
Xcel Energy	Substation feeder power line.	272 acres
RHEP Crude LLC	Oil pipeline.	77 acres
Plains All American Pipeline	Cotton Draw Expansion oil pipeline.	101 acres
Various Companies	Water use for mineral development.	12,980 acres 38,943 acre-feet
Lincoln National Forest Plan Revision	The Lincoln National Forest Plan is under revision. All resources and resource uses would be subject to changes in management.	Not known
Carlsbad Caverns and Guadalupe National Parks	Both national parks are managed for conservation.	Not known

Additional reasonably foreseeable future actions include the predicted number of oil and gas wells under each of the alternatives would disturb between 24,187 acres and 27,732 acres of soils and vegetation. Table 4-240 outlines the number of acres that would be disturbed for oil and gas development by alternative for BLM and non-BLM-administered lands.

Table 4-240. Predicted Surface Disturbance within CFO Planning Area

	No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Total predicted surface disturbance/acres on **BLM-administered lands only**	11,515	8,753	6,936	11,434	11,849
Total predicted surface disturbance/acres on **non-BLM-administered lands**[8]	14,115	14,115	14,115	14,115	14,115
Total predicted surface disturbance/acres on all lands after reclamation	22,751	20,680	19.317	22,690	23,002

Cumulative impacts from oil and gas development, including water use, would be greatest under Alternatives C and D as compared to the No Action Alternative. Alternatives A and B would contribute the least amount of surface disturbance reducing overall cumulative impacts. Cumulative impacts specific to each resource and resource use are discussed in the sections below.

[8] This number remains static and does not vary by alternative because BLM does not have jurisdiction over these lands and it is not known how many acres would be open or closed for development)

4.6.1 Soil and Water Resources

Past and present actions that affect and have affected soil and water resources include land use authorizations, livestock grazing, recreational uses (including OHVs, non-motorized recreation, etc.), mineral exploration and development, fire and fuels treatments, and other vegetation treatments, including noxious weeds management. Chapter 3, Section 3.2.2 provides greater details on the effect of past and present actions on soil and water resources, but in general these actions have all had cumulatively adverse impacts on soil and water resources by causing surface disturbance contributing to reduced soil productivity, alterations in water quality parameters, soil compaction, erosion, and increased sediment loading. They have also resulted in the introduction of invasive weeds, which can affect water resources through increased evapotranspiration rates, and soil resources through alterations to soil chemistry and productivity. Water withdrawals and impoundments have limited water availability and quality (see Chapter 3, Section 3.2.2).

Reasonably foreseeable future actions in the planning area that would affect soil and water resources include an expansion of mineral exploration, development, and production and energy development in general. All of these actions would have an adverse effect on soil and water resources from resulting surface disturbance and water use associated with these projects. Cumulative impacts, associated with decreased soil and water quality across the planning area, would be minimized through various management prescriptions and stipulations in place. The oil and gas industry's reliance on surface water resources and recycling of fracturing fluids and/or produced water rather than the use of fresh groundwater resources would cause little cumulative impact on groundwater availability. With an anticipated increase in wells and water use, the failure of wells in the region – not just those related to oil and gas development – could increase the communication between surface water and groundwater, thereby increasing the risk of water contamination. In addition, increased activity in the Cumulative Impacts Analysis Area would increase the risk of spills and groundwater contamination. Compliance with stipulations, BMPs, and existing rules and regulations would combine to reduce the potential of groundwater contamination. Further, the likelihood that an unintended release would occur simultaneously with another event that could exacerbate or be exacerbated by a release is low and unlikely to create a cumulative effect.

The Restore New Mexico program would contribute to beneficial cumulative impacts as additional acres are restored to historical, native vegetative communities annually.

Under all alternatives, soil and water resources would benefit from management, in accordance with the Standards and Guidelines. Adherence to these standards would reduce many of the cumulative adverse impacts from future actions. Under all action alternatives, recreational travel designation across the planning area would change from open to limited, thereby reducing negative cumulative impacts to soil and water resources. In general, Alternatives C and D would be the least protective of soil and water resources and would have the least mitigating effect on past impacts to soil and water resources in the planning area because they have the greatest percent of area open to surface disturbance. Alternative B would be the most protective and would provide the greatest reduction of cumulative impacts by excluding the most acres from grazing and predicting the least number of acres of surface disturbance.

4.6.2 Karst Resources

Past and present actions that affect and have affected karst resources include all surface- and subsurface-disturbing activities, particularly those occurring over high (including hydrologically important critical karst resource zones) and medium karst potential occurrence areas, including mineral exploration and development, livestock grazing, upland vegetation, including noxious weeds, management, fire management, and land use authorizations. Chapter 3, Section 3.2.3 provides greater details on the effect of past and present actions on karst resources. Cumulative impacts resulting from these past activities include an increased fragmentation of the overall karst landscape, as specific karst feature footprints are protected but do not consider a broader management view of whole-field and subsurface development. Other cumulative impacts include increased alterations to surface and subsurface drainage patterns, increased disruptions to subterranean environment, including changes in airflow patterns, requisite humidity levels for cave-adapted species and contamination.

Reasonably foreseeable actions that would impact karst resources include those future actions associated with mineral exploration and development, fire management, livestock grazing, and other ground-disturbing activities. Mineral exploration and development activities would contribute to greater fragmentation across the karst landscape within the planning area and increase the potential for groundwater contamination. Reasonably foreseeable future actions associated with fire and vegetation management would result in short-term adverse impacts to karst resources; however, long-term, indirect benefits would occur as the surface vegetative community recovers and moves I DPC (see Chapter 4, Section 0 for discussion on the importance of the surface vegetative community on karst resources).

Cumulative adverse impacts to karst resources would be minimized by the designation of the Cave Resources ACEC. Fragmentation across the karst landscape and disruptions within the subterranean environment would be reduced, as management prescriptions would minimize surface and subsurface disturbances within this ACEC. In general, Alternatives C and D would be the least protective of karst resources, as disturbance buffers are reduced under these alternatives compared to Alternatives A and B. Alternative B would be the most protective and would provide the greatest reduction of most cumulative impacts by excluding the most acres from grazing and predicting the least number of acres of surface disturbance, although the effect of fragmentation across karst landscapes would continue to increase.

4.6.3 Vegetative Communities

4.6.3.1 Upland Vegetation Including Noxious Weeds

Past and present actions that affect and have affected upland vegetation and noxious weeds management include land use authorizations, livestock grazing, recreational uses (including OHVs, non-motorized recreation, etc.), mineral exploration and development, fire and fuels treatments, and other vegetation treatments, including noxious weeds management. Chapter 3, Section 3.2.4 provides greater details on the effect of past and present actions on upland vegetation and noxious weeds management, but in general these actions have all had cumulatively adverse impacts by causing surface disturbance contributing to reduced plant cover and diversity, increased abundance of noxious weeds, greater habitat fragmentation, diminished habitat condition for monarch butterflies and other pollinators, and loss of pollinators. Previous vegetation treatments, both prescribed fire and mechanical/chemical means, have imparted long-term beneficial effects as a greater number of acres of plant communities are gradually returned to DPC.

Reasonably foreseeable actions that affect and have affected upland vegetation and noxious weed management include oil and gas development, which has occurred across the planning area in the past and would continue into the future. The spatial layout of oil and gas facilities disturbs a large proportion of vegetation (and also wildlife habitat) when considered across the region. Each disturbed area for a well pad increases the opportunity for weed invasions and disrupts the spatial continuity of vegetation communities, leading to increased fragmentation. Other activities such as road building and increased OHV use could increase human access and trampling of vegetation. Major contributors include OHV activities; habitat destruction from mineral development–related activities; some vegetation treatments, such as sagebrush removal; and possible livestock water developments resulting in redistribution of livestock into previously unused areas. The Restore New Mexico program would contribute to beneficial cumulative impacts as additional acres are restored to historical, native vegetative communities annually.

Under all alternatives, upland vegetation and noxious weeds management would benefit from management prescriptions, in accordance with the Standards and Guidelines. Adherence to these standards would reduce many of the cumulative adverse impacts from future actions. Under all action alternatives recreational travel designation across the planning area would change from open to limited, thereby reducing negative cumulative impacts to upland vegetation, including increased damage from trampling and bare ground, decreased plant diversity and increased presence of noxious weeds. In general, Alternatives C and D would be the least protective of upland vegetation and would have the least mitigating effect on past impacts to upland vegetation in the planning area. Alternative B would be the most protective and would provide the greatest reduction of cumulative impacts by excluding the most acres from grazing and predicting the least number of acres of surface disturbance.

4.6.3.2 Riparian and Wetland Vegetation

Past and present actions within the planning area that affect and have affected riparian areas include livestock grazing, recreational uses (including OHVs, non-motorized recreation, etc.), mineral exploration and development, and upstream water withdrawals and impoundments. In general, these actions have had some cumulatively adverse impacts on riparian health, such as decreased water quality in some systems, decreased riparian plant diversity, and greater loss of streambank stability. Livestock grazing, recreation, and mineral-related activities have led to surface disturbance, soil compaction, removal of riparian vegetation, bank trampling, and alteration of riparian areas' physical structure. They have also resulting in the widespread introduction of invasive weeds. Water withdrawals and impoundments have limited the health and extent of riparian zones by decreasing water availability and encouraged the introduction of invasive plants through the stabilization of formerly dynamic sediment deposits, such as bars and banks. Chapter 3, Section 3.2.4.2 provides greater details on the effect of past and present actions on riparian and wetland resources.

Reasonably foreseeable future actions that would affect riparian areas include an expansion of ongoing mineral exploration, development, and extraction. These actions could have a potential adverse effect on riparian areas. Under all of the alternatives, riparian resources would benefit from management for PFC, in accordance with the Standards and Guidelines. This would mitigate many of the adverse impacts from past, present, and future actions. In addition, continuing closure of several allotments to grazing with perennial streams and riparian vegetation would continue the restoration and enhancement of riparian resources in these areas.

In general, Alternatives C and D would be the least protective riparian and wetland resources, as proposed buffers around springs, seeps, and downstream riparian areas would be smaller than those proposed buffers in Alternatives A and B. Alternative B would be the most protective and would provide the greatest reduction of cumulative impacts by excluding the most riparian acres from grazing and predicting the least number of acres of surface disturbance, all of which would benefit riparian and wetland resources.

4.6.4 Fish and Wildlife

4.6.4.1 Fish

Past and present actions that have impacted non-special status fish include leasable mineral development on BLM-administered and non-BLM-administered lands in the planning area. Leasable mineral development is a surface-disturbing activity, which results in the off-site movement of soils and increase sediment loading and turbidity into nearby water bodies. In addition, such activities provide opportunities for invasive vegetation and noxious, non-native species to take hold in compromised water bodies. The development of oil and gas wells also require a large amount of water. The combined surface disturbance and water depletions resulting from leasable mineral development could be detrimental to fish, especially when the activities are located close to the Pecos, Delaware, and Black Rivers, which are the largest perennial rivers in the planning area.

Reasonably foreseeable future actions that could cumulatively impact fish include oil and gas on non-federal lands and potash development on both federal and non-federal lands. The RFD estimates 480 new wells per year would be drilled on non-federal lands over the next 20 years. Thus an estimated 9,600 wells on non-federal land are projected. Fresh water is required for hydraulic fracturing. The RFD estimates 4 million gallons of water or 6 acre-feet is needed per well. Approximately 30% of the water pumped to supply the oil and gas industry is from Eddy County, where direct connections to the Pecos, Delaware, and Black Rivers occur. The water wells to supply this water are under the jurisdiction of the New Mexico Office of the State Engineer (NMOSE). As new wells are drilled and existing wells are pumped at a higher rate, cumulative adverse impacts to fish species could occur if the pumping results in drawdown of the surface water levels. For example, the groundwater wells used to supply Intercontinental Potash's Ochoa Potash Mine is estimated to change the base flow of the Pecos River by approximately 28 acre-feet per year (BLM 2014a). The cumulative impacts of these uses could lead to a lower population of fish in the future.

Mineral development activities on that have a cumulative adverse impact to fish would be the same for all alternatives. Cumulative adverse impacts to fish, when ranked in order from the least adverse impacts to the greatest adverse impacts, would occur from Alternatives A, B, C, D, and then the No Action Alternative. The least amount of cumulative adverse impacts would occur under Alternative A because the fewest acres of special designations would be managed, the Delaware River and Black River would be recommended for WSR designation, and the greatest number of acres would be closed to leasable mineral development. Cumulative adverse impacts would be the greatest under the No Action Alternative because the Delaware and Black Rivers would not be managed as part of the NWSRS and the greatest number of acres would be open to leasable mineral development.

4.6.4.2 Wildlife

Oil and gas development has occurred and is expected to continue across this region on both BLM-administered and non-BLM-administered lands in the planning area. This development reduces habitat available to wildlife and contributes to habitat fragmentation through the clearing of roads and pads. Noise associated with this development may also reduce habitat used by wildlife. The removal of native vegetation and soil disturbance increases the opportunity for invasive weed infestation and disrupts the spatial continuity of vegetation communities that support wildlife in a semiarid environment. This development is accompanied by pipelines and gas plants, the former results in temporary habitat loss and displacement for wildlife, and the latter, permanent habitat loss. Regional wildlife populations have likely been negatively impacted by recent oil and gas development in the planning area.

Reasonably foreseeable actions include completion of additional oil and gas development on approximately 25,000 acres within the planning area for all the alternatives. Alternatives A and B would result in slightly less total surface acreage impacted. All alternative would result in additional surface disturbance that would remove valuable habitat for wildlife and create additional landscape fragmentation. The intensity of oil and gas development in the region is dictated primarily by the cost of the resource being extracted. With the fluctuation in gas prices it is expected that the pressure for future development would be cyclic. However, oil and gas development in years prior to 2015 outside BLM-administered lands in the planning area has been intensive. Recently gas prices have declined causing a slowdown in development. It can be expected that future prices would increase and stimulate a resurgence in oil and gas development within the planning area and on non-BLM-administered lands adjacent to the planning area. Potash and other mineral mining would further reduce wildlife habitat. The combination of disturbance associated with mining and oil and gas development would continue to put pressure on regional wildlife populations.

Use of prescribed fire and the efforts of Restore New Mexico would result in temporary disturbance to wildlife habitat and short-term displacement. However, these programs, if successful, would restore vast areas of valuable native grassland habitat and potentially offset long-term losses to development. Implementation of the three HMPs would improve habitat for a wide range of wildlife species and further mitigate for previous and future habitat loss from development.

4.6.5 Special Status Species

4.6.5.1 Plants

Surface disturbance associated with mineral and energy development, forage use by livestock and wildlife species, and OHV use in open areas would result in cumulative effects throughout the planning area.

Oil and gas development has occurred across this region on both BLM-administered and non-BLM-administered lands in the past and would continue into the future. The combined amount of surface disturbance of these past, present, and future actions could be detrimental to sensitive plants. The spatial layout of oil and gas facilities disturbs a large proportion of vegetation habitat when considered across the region. Each disturbed area for a well pad increases the opportunity for weed invasions and disrupts the spatial continuity of vegetation communities, and hence, habitat for sensitive plant species. Other activities such as road building and increased OHV use could increase human access to sensitive areas that special status species, vegetation, and wildlife are dependent upon for survival.

The overall cumulative impact of activities proposed on these resources could be detrimental at localized areas within the short term, with long-term improvements for (non-special status) vegetation habitat. Major contributors on both BLM and non-BLM-administered lands include OHV activities; habitat destruction from mineral development related activities; vegetation treatments such as sagebrush removal; and possible livestock water developments resulting in redistribution of livestock into previously unused areas that are sensitive to disturbance. Direct impacts would be due to loss of individual sensitive plants or animals from mineral, oil, and gas related development. Indirect impacts on both BLM and non-BLM-administered lands would also occur with habitat fragmentation due to development, changes in OHV use due to increased roads, and rock/fossil collection. These activities would concentrate grazing pressures and recreation use on habitat sites for some plant and wildlife species. The conversion of land use from agricultural lands to residential and commercial uses would increase the habitat values of undeveloped land. The change in land use could result in the loss of habitat for some wildlife species.

The cumulative impacts of all the uses discussed above on both BLM and non-BLM-administered lands could lead to lower populations of sensitive (and non-sensitive) plants in the future. However, protections provided by the Endangered Species Act would minimize the potential adverse cumulative impacts to listed species. Conversely, beneficial impacts would be obtained with BLM designation of proposed ACECs, WSRs, and management of land with wilderness characteristics, because numerous plant populations and habitats would be given special management protection within the boundaries of those areas. As a result of these proposed designations, the incremental contribution to the cumulative impacts on plants and their habitats would be the greatest under the No Action Alternative and Alternative D, the least amount under Alternatives A and B, and to a lesser extent Alternative C.

4.6.5.2 Fish

Past and present actions that have impacted special status fish include leasable mineral development on BLM and non-BLM-administered lands in the planning area. Leasable mineral development is a surface-disturbing activity, which results in the off-site movement of soils and increase sediment loading and turbidity into nearby water bodies. In addition, such activities provide opportunities for invasive vegetation and noxious, non-native species to take hold in compromised water bodies. The development of oil and gas wells also require a large amount of water. The combined surface disturbance and water depletions resulting from leasable mineral development could be detrimental to special status fish, especially when the activities are located close to the Pecos, Delaware, and Black Rivers, where known populations of special status species occur.

Reasonably foreseeable future actions that could cumulatively impact special status fish include oil and gas on non-federal lands and potash development on both federal and non-federal lands. The RFD estimates 480 new wells per year would be drilled on non-federal lands over the next 20 years. Thus an estimated 9,600 wells on non-federal land are projected. Fresh water is required for hydraulic fracturing. The RFD estimates 4 million gallons of water or 6 acre-feet is needed per well. Approximately 30% of the water pumped to supply the oil and gas industry is from Eddy County, where direct connections to the Pecos, Delaware, and Black Rivers occur. The water wells to supply this water are under the jurisdiction of the NMOSE. As new wells are drilled and existing wells are pumped at a higher rate, cumulative adverse impacts to special status fish species could occur if the pumping results in drawdown of the surface water levels. For example, the groundwater wells used to supply Intercontinental Potash's Ochoa Potash Mine is estimated to change the base flow of the Pecos River by approximately 28 acre-feet per year (BLM 2014a). The cumulative impacts of these uses could lead to a lower population of special status fish in the future. However, protections provided by the Endangered Species Act would minimize the potential adverse cumulative impacts to listed species.

Activities on non-federal lands that have a cumulative adverse impact to special status fish would be the same for all alternatives. Cumulative adverse impacts to special status fish, when ranked in order from the least adverse impacts to the greatest adverse impacts, would occur from Alternatives A, B, C, D, and then the No Action Alternative. The least amount of cumulative adverse impacts would occur under Alternative A because the Pecos Bluntnose Shiner ACEC would be designated, the Delaware River and Black River would be recommended for WSR designation, and the greatest number of acres would be closed to

leasable mineral development. Cumulative adverse impacts would be the greatest under the No Action Alternative because the Delaware and Black Rivers would not be managed as part of the WSR system and the greatest number of acres would be open to leasable mineral development.

4.6.5.3 Wildlife

As with the impacts on wildlife, the extensive regional oil and gas development has likely reduced the amount of habitat available for special status species. Although some of these species are protected (LPC, DSL, aplomado falcon, several cactus species) by BLM practices, including conservation agreements, as well as the implementation of USFWS and NMDGF protection measures to protect or mitigate for impacts to species habitat, the intensive development has reduced areas that could have potentially been used to expand species populations. Roads and pads associated with oil and gas development contribute to habitat fragmentation and may inhibit special status species from colonizing other suitable habitat.

Reasonably foreseeable projects that could adversely impact special status species include developments that would result in habitat loss or fragmentation. Mineral developments, new road projects, transmission lines, renewable energy projects, and other surface-disturbance activities that occur on BLM-administered lands and on adjacent private lands could have a detrimental impact on these species. Completion of additional oil and gas development is expected on approximately 25,000 acres within the planning area for all the alternatives. Alternatives A and B would result in slightly less total surface acreage impacted. All alternative would result in additional surface disturbance that could remove potential habitat for special status species and create additional landscape fragmentation that might prevent these species from colonizing new areas. Recently gas prices have declined causing a slowdown in development, but it can be expected that prices would increase in the future and stimulate a resurgence in oil and gas development within the planning area and on non-BLM-administered lands adjacent to the planning area.

Use of prescribed fire and the efforts of Restore New Mexico would result in temporary disturbance to wildlife habitat and short-term displacement. However, these programs, if successfully targeted could restore vast areas of valuable native grassland habitat and roads that currently cause fragmentation. These actions could have a long-term benefit for special status species.

4.6.6 Wildland Fire and Fuels Management

Many fire prone areas within the planning area are at increased risk of uncharacteristic wildfire due to historic fire management practices. Past and present treatments on all jurisdictions to reduce fuel loads and restore woodlands, forests and grasslands I their natural range of variability, has contributed to reducing this risk within the planning area, and on a landscape scale, which is important due to the potential of fire spread from adjacent properties. In addition, past and present actions within the planning area that have increased the amount of urban development in the area have also impacted fire and fuels management through increasing the number of WUI acres adjacent to BLM-administered lands. Past surface-disturbing activities, such as the construction of oil and gas well pads, access roads, transmission lines, and other linear features, break up the continuity of fuels and potentially reduce fire spread; however, increased access roads have increased human-caused ignitions and existing oil and gas infrastructure may contribute to ignitions due to unintentional releases or explosions. The current fire environment and wildfire hazard and risk is described in detail in the affected environment section.

Reasonably foreseeable future actions that have the potential to impact fire and fuels management within the planning area include future planned prescribed fire and mechanical treatments by non-BLM agencies over the next 20 years, and Restore NM treatments that focus on restoration of overgrown woodlands and grassland. These actions would have beneficial cumulative impacts to fire management within the planning area by reducing fuel loading and breaking up the continuity of fuels reducing the risk and spread of catastrophic wildfire. These planned future treatments total over 5.2 million acres. Under the guidance of the 2004 Fire & Fuels RMP Amendment and the CFO FMP and other fire plans in adjacent BLM Field Offices and USFS Ranger Districts, including the revision of the Lincoln National Forest Plan, fuel load reductions, vegetation treatments, and salvage operations would reduce the risk of wildland fire in the planning area.

Additional impacts to fire management from reasonably foreseeable future actions include planned oil and gas infrastructure development, transmission lines, access roads, and other linear features. Those actions that result in the greatest permanent surface disturbance would, however, break up the continuity of wildland fuels reducing potential fire spread. Alternatives C and D would contribute the greatest amount of surface disturbance. Although the footprint of such development may break up surface fuels, such development would also provide additional access roads that increase potential for human-caused wildfire ignitions, as well as potential oil and gas ignited fires.

4.6.7 Cultural Resources

Past and present actions that have impacted cultural resources in the planning area include approximately 120,000 acres of surface-disturbing activities, such as past construction of oil and gas well pads, access roads, transmission lines, other linear features, and improved access. The impacts from these actions can be considered in five categories: 1) authorized physical disturbance of individual cultural resources, 2) unauthorized physical disturbance of individual cultural resources, 3) visual intrusion on individual cultural resources and cultural landscapes, 4) looting and vandalism due to increased access, and 5) incremental loss—from all sources—of resources comprising the broader cultural record of the area. Impacts under the first category—authorized disturbance—have occurred in situations where the resource or resources in question were either deemed not eligible for the NRHP or lacking religious or traditional significance or were deemed eligible for the NRHP and subject to mitigation measures to preserve important data prior to disturbance. Under the second category, cultural resources would have been damaged inadvertently through surface disturbance, OHV travel, etc. Impacts under the third category derive from placing aboveground structures or large-scale landscape alterations within the viewshed of individual cultural resources or areas of cultural resource concentration where setting and feeling stemming from the viewshed are important characteristics of those resources. Under the fourth category, increased access, as manifested in new transportation corridors to access project developments, has likely increased opportunities for looting and vandalism of sites not previously known or accessible to users of the area. The fifth category of impacts considers the broader archaeological and cultural record of the planning area, rather than individual sites or resources and the incremental loss of or damage to that record through the impacts under each of the other four categories. Data are not available to quantify the impacts under each category; however, it is important to note that impacts not accounted for through the Section 106 process and BLM cultural resource management policies are expected to have constituted a very small percentage of the total past impacts to cultural resources. That is, unauthorized impacts wherein consideration of the cultural, religious, or scientific importance of a given resource were not considered prior to impact are expected to represent a small proportion of impacts stemming from past and present actions.

Reasonably foreseeable actions with the potential to affect cultural resources include those actions with surface-disturbing components listed in Table 4-239 above. Together, these actions are anticipated to result in just less than 1.1 million acres of new surface disturbance over the life of the RMP. Of this, approximately 1 million acres would result from vegetation and habitat treatments. These treatments, as with all reasonably foreseeable future actions, would be subject to the requirements of the NHPA, its Section 106 process, and BLM policies for the consideration of cultural resources prior to implementation. As such, anticipated future loss of or damage to cultural resources of cultural, religious, or scientific value is expected to be limited to inadvertent and (rarely) unauthorized actions.

Many decisions related to VRM, special designations, and restrictions on surface disturbance—whether past, present, or reasonably foreseeable—have provided or would provide a net positive benefit to cultural resources within the planning area. These decisions reduce or control the frequency and extent of ground-disturbing activities that present the greatest threat to maintaining the use values of cultural resources.

The potential contributions to cumulative effects on cultural resources from the current array of alternatives would vary somewhat between them. On the whole, Alternative C would contribute the least potential risk and the most potential benefit to cumulative effects on cultural resources. This alternative generally includes the fewest acres open to surface-disturbing activities or open with limited constraints. It also generally includes the greatest number of acres closed or restricted to surface disturbances through such actions as special designations, VRM, etc. By contrast, the No Action Alternative and Alternative D would contribute

the most potential risk to cultural resources among the alternatives; on the whole these two alternatives are roughly comparable. They include the least net benefit to cultural resources from avoidance, exclusion, withdrawn, closed, and VRM Class I and II lands wherein surface disturbance would be restricted. They also include the most acreage allocated to lands open to surface-disturbing activities with minimal restrictions. Alternatives A and C would contribute less potential benefit than Alternative B but more than Alternative D and the No Action Alternative and more potential risk to cultural resources than Alternative B but less than Alternative D and the No Action Alternative.

Although there are differences between the alternatives, the incremental contribution of any of the alternatives on the cumulative impacts to cultural resources is anticipated to be minimal since cultural resources are managed in compliance with federal laws, regulations, and policies designed to avoid, minimize, and mitigate adverse effects to resources of cultural, religious, or scientific importance.

4.6.8 Paleontological Resources

Past and present actions that have impacted paleontological resources include unauthorized OHV use, dispersed recreation, and vandalism. These impacts would be reduced under Alternatives A and B and to a lesser extent Alternative C because they provide more constraints on OHV use and dispersed recreation activities. There would also be impacts as a result of permitted surface-disturbing activities, such as mineral development in areas containing paleontological resources. The potential for inadvertent adverse impacts to paleontological resources from surface-disturbing activities would be greater under the No Action Alternative and Alternative D. However, existing laws, regulations, and policies provide for mitigation through avoidance or data recovery efforts. Although it is expected that some fossils would be destroyed in the course of legitimate uses of public lands, mitigation measures would likely bring paleontologists to areas where fossils had not been previously studied. Thus, some fossils that would otherwise have disintegrated over time due to weathering and erosion would be collected, placed in repositories, and protected in perpetuity. Cumulative impacts on paleontological resources could occur through incremental degradation of the resource base by a variety of sources, reducing the information and interpretive potential of the paleontological resources in the region. Activities on lands that are not protected by federal laws or policies protecting paleontological resources could decrease the regional resource base, increasing the scientific value of the paleontological resources within the entire planning area.

The incremental contribution to the overall cumulative impacts on paleontological resources would be greatest under the No Action Alternative and Alternative D. Alternatives A and B would have the least potential for adverse cumulative impacts followed to a lesser extent by Alternative C.

4.6.9 Lands with Wilderness Characteristics

Past and present actions that have impacted lands with wilderness characteristics include development of roads for access to lands, surface disturbance and infrastructure related to mineral and energy development, utility corridors, and OHV use. Within the planning area, a total of 57,359 acres (eight areas) was found to have wilderness characteristics. Under the No Action Alternative, no lands would be managed for wilderness characteristics. Potential for adverse cumulative impacts to lands with wilderness characteristics would be the greatest under this alternative. For Alternative A, all eight areas would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. These areas would be retained for wilderness character despite any past, present, and reasonably foreseeable future actions. For Alternative B, six areas would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. These areas would be retained for wilderness character despite any past, present, and reasonably foreseeable future actions. In the two remaining areas not managed under this alternative, if developed, wilderness qualities would not be retained on those parcels. For Alternative C, five areas would be managed to protect the wilderness characteristics of size, naturalness, and opportunities for solitude or primitive and unconfined recreation. These areas would be retained for wilderness character despite any past, present, and reasonably foreseeable future actions. In the three remaining areas not managed under this alternative, if developed, wilderness qualities would not be retained on those parcels. For Alternative D, two areas would be managed to protect the wilderness characteristics of size,

naturalness, and opportunities for solitude or primitive and unconfined recreation. These areas would be retained for wilderness character despite any past, present, and reasonably foreseeable future actions. In the six remaining areas not managed under this alternative, if developed, wilderness qualities would not be retained on those parcels.

Other resource and resource use decisions for the RMP could contribute to cumulative impacts on lands with wilderness characteristics. For example, under Alternatives A and B the Birds of Prey ACEC would be designated and where this designation overlaps lands with wilderness characteristics beneficial cumulative impacts would occur even if the area is not managed for wilderness characteristics. The VRM Class II management prescriptions for the Guadalupe Escarpment Scenic Area under all alternatives would also have a beneficial cumulative impact on lands with wilderness characteristics where they occur.

4.6.10 Visual Resources

Past and present actions that have impacted visual resources include oil and gas exploration and development, industrial development, agriculture, potash mining, OHV recreation designations, and utility corridor development. Oil and gas surface disturbances from well pad construction and infrastructure construction (e.g., drilling structures, access roads, pump jacks, pipelines), industry-related roads and buildings, potash mining waste dumps, power transmission lines, and surface disturbances from off-trail OHV use have cumulatively contributed to an adverse loss of scenic quality. These impacts are described in detail in Chapter 3, Section 3.2.11, and have, in general, created visually intrusive forms, lines, colors, and textures on the natural landscape.

Any reasonably foreseeable future actions that would create surface disturbances or visual contrasts on the landscape would have an effect on visual resources. Within the planning area, these actions would be pipeline laying for collection or distribution of oil and gas fluid minerals, gas plant construction, potash mining expansion, power transmission line construction, industrial water well drilling, and continuing oil and gas exploration and development. All of these projects would create surface disturbances and visual contrasts with the surrounding landscape and adversely contribute to the existing scenic quality impacts on the planning area's landscapes. When comparing the proposed action alternatives to the cumulative impacts on visual resources, Alternative B would have the most beneficial impacts on visual resources and scenic quality because actions under this alternative would protect more acreage within the planning area under VRM Class I and II objectives than the other alternatives. The VRM Class I and II resource objectives would prohibit or limit long-term surface disturbances caused by the reasonably foreseeable future projects discussed above.

Under the proposed RMP, the actions under the other proposed alternatives would have varying effects on visual resources and scenic quality when compared with the cumulative effects of past, present, and foreseeable future actions. Alternative A would protect scenic quality by preserving or limiting surface disturbances within the landscape under VRM Class I and II objectives to a slightly lesser degree than Alternative B. Alternative D would have the least beneficial effects on visual resources by designating the fewest planning area acreage under VRM Class I and II, while Alternative C would have similar VRM designations and actions (but slightly more beneficial to scenic quality protection).

4.6.11 Air Resources

The cumulative impacts of mineral actions on air quality were evaluated over a 20-year time frame and over the 4-km modeling domain for the far-field modeling analyses. A 2008 emission inventory was developed to portray 2008 U.S. emissions at various temporal and spatial scales.

Two 2028 RFD emission inventories for BLM-administered lands in the planning area were developed for the planning area. These inventories included emissions related to oil and gas development, and fugitive dust from construction activity and land development and vehicle traffic associated with the oil and gas development. Emissions were also included for mining activity on BLM-administered lands in the planning area.

The final emission inventory included RFD sources on non-BLM-administered and other reasonable foreseeable future actions. The RFD sources included oil and gas and other resource development. Reasonable foreseeable future action sources included estimates for the entire U.S., and included large power generation and industrial sources, livestock management, farming, on-road mobile, off-road construction, biogenic, and wildfire.

The air quality modeling was performed for 2028 to evaluate cumulative impacts from the sources on BLM-administered lands and sources on non-BLM-administered lands.

Table 4-241 summarizes the cumulative air quality impacts from the projected emissions for 2028 for each of the alternatives. Significant cumulative impacts were predicted for $PM_{2.5}$, SO_2, visibility, nitrogen deposition, sulfur deposition, and acid neutralizing capacity. As described above, project only impacts are minimal. Almost all of the predicted impacts are attributable to non-project sources (i.e., No Action Alternative).

Table 4-241. Summary of Cumulative Impacts of Mineral Actions on Air Quality

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Far-Field Modeling Analyses				
Carbon Monoxide				
1-hour and 8-hour impacts below NAAQS/ NMAAQS	Cumulative 1-hour and 8-hour impacts below NAAQS/ NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/ NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/ NMAAQS.	Cumulative 1-hour and 8-hour impacts below NAAQS/ NMAAQS.
Nitrogen Oxides				
1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.	Cumulative 1-hour and annual impacts below NAAQS.
Ozone				
10 of 31 monitors had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitors had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitors had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitors had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).	Cumulative impacts showed 10 of 31 monitors had 8-hour design values above NAAQS (maximum 79 ppb in the Four Corners area vs. 75 ppb standard).
PM_{10}				
24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.	Cumulative 24-hour impacts below NAAQS.
$PM_{2.5}$				
2 of 11 monitors had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX, vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX, vs. 12 $\mu g/m^3$ standard).	2 of 11 monitors had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX, vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX, vs. 12 $\mu g/m^3$ standard).	2 of 11 monitors had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX, vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX, vs. 12 $\mu g/m^3$ standard).	2 of 11 monitors had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX, vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX, vs. 12 $\mu g/m^3$ standard).	2 of 11 monitors had 24-hour design values above the NAAQS (maximum 43 $\mu g/m^3$ in Odessa, TX, vs. 35 $\mu g/m^3$ standard). 4 of 11 monitors had annual design values above the NAAQS (maximum 17 $\mu g/m^3$ in Odessa, TX, vs. 12 $\mu g/m^3$ standard).

No Action Alternative	Alternative A	Alternative B	Alternative C	Alternative D
Sulfur Dioxide				
1-hour impacts above the NAAQS (maximum 16 times the 196 μg/m^3 standard in Amarillo, TX). 3-hour, 24-hour, and annual impacts below NAAQS.	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 μg/m^3 standard in Amarillo, TX).	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 μg/m^3 standard in Amarillo, TX).	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 μg/m^3 standard in Amarillo, TX).	Cumulative 1-hour impacts above the NAAQS. 3-hour, 24-hour, and annual impacts below NAAQS (maximum 16 times the 196 μg/m^3 standard in Amarillo, TX).
Visibility at Class I Areas				
366 days (leap year) of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.
Visibility at Sensitive Class II Areas				
366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.	For cumulative impacts, 366 days of significant visibility change.
Nitrogen Deposition				
Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).	Above the LOC at all receptors (maximum impact a factor of 11.2 times the LOC).
Sulfur Deposition				
Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).	Predicted impacts above the LOC at most receptors (maximum impact approximately 8.6 times the LOC).
Lake Acid Neutralizing Capacity				
Above the LAC for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).	Cumulative impacts above the LACs for all lakes (maximum impact approximately 174 times the LAC).

4.6.12 Minerals

4.6.12.1 Leasable Minerals

Past and present actions that have impacted leasable minerals include other mineral development decisions and projects that have occurred in the planning area. The RFD estimates 61% of the wells drilled within the planning area have occurred (and would continue to occur) on non-federal lands, meaning state or private lands (Engler and Cather 2014). Mineral leasing on State of New Mexico mineral estate is administered by the Commissioner of Public Lands through the New Mexico State Land Office. The state leases minerals to generate revenue for the benefit of the state land trust (New Mexico State Land Office 2015). Overall, the approval of mineral leasing activities within the planning area has a beneficial impact to

leasable mineral development and results in the generation of royalties. Adverse impacts to leasable mineral development would occur as a result of restrictions on mineral leasing on state lands beyond the standard lease terms may be applied through special federal lease stipulations attached to the state lease (New Mexico State Land Office 2013). Where mineral estate is owned by private entities, those entities may place restrictions or constraints on mineral leasing; however, the type and extent of those restrictions are unknown.

Constraints placed on mineral leasing on non-federal lands could lead to increased costs and time required to fully develop leasable minerals and could influence an operator's investment decision to conduct exploration. Impacts to mineral development include the relocation of drilling operations, the use of other drilling methods, such as directional drilling and timing delays. In many cases, these would be considered typical costs of doing business.

Reasonably foreseeable future actions that would impact leasable minerals include new oil, gas, and potash development projects. The RFD estimates 480 new wells per year would be drilled on non-federal lands over the next 20 years. Thus an estimated 9,600 wells on non-federal land are projected. An estimated 7,000 acres of new potash development is also projected (see Table 4-239 above). The new leasable mineral development would necessitate supporting infrastructure, such as roads, pipelines, aboveground facilities, and transmissions lines. As infrastructure is constructed, additional coordination and planning by operators would be required to avoid conflicts in the field. Therefore, routing and location constraints may be placed on leasable mineral operators as a result of future development.

As discussed under the direct and indirect impacts section for leasable minerals, Alternative B would place the highest amount of constraints on leasable minerals through lease stipulations, COAs, and BMPs. Alternative D would result in the least amount of constraints on leasable minerals. Cumulative adverse impacts to leasable mineral development would occur from administrative constraints placed on leasable mineral development on non-federal lands and from location constraints caused by future development activities in the planning area.

4.6.12.2 Locatable Minerals

Based on historical data and only one producing mine, the development potential for locatable mineral deposits is low across the entire planning area. This analysis assumes locatable mineral development is expected to occur at levels similar to the past. One mining claim and one locatable mineral mine is projected for the next 20 years. The potential for development activity for mineral specimen gypsum and gemstones is moderate in southwestern Eddy County and low throughout the rest of the planning area for all other locatable minerals (e.g., gypsum, metallurgical-grade limestone, and many metals and non-metals) during the planning period. Considering this level of activity, it is anticipated that there would be no cumulative impacts to locatable minerals because the demand for access to minerals within the planning area is less than the areas designated as open to mineral entry under each alternative.

4.6.12.3 Salable Minerals

Past and present actions that have impacted salable minerals include leasable and salable mineral development projects that have occurred in the planning area. Overall, the approval of both mineral leasing activities and salable mineral development within the planning area have beneficially impacted salable minerals due to the increase in demand for salable minerals and approval of new salable mineral operations. An estimated 61% of the wells drilled within the planning area have occurred (and would continue to occur) on non-federal lands, meaning state or private lands (Engler and Cather 2014). Leasable mineral development relies upon salable minerals, such as caliche, sand, and gravel; therefore, leasable mineral development increases the demand for salable minerals on both federal and non-federal lands. Salable mineral development on State of New Mexico lands is administered by the Commissioner of Public Lands through the New Mexico State Land Office. The state leases industrial minerals to generate revenue for the benefit of the state land trust (New Mexico State Land Office 2015). Salable minerals can also be obtained on privately owned lands within the planning area.

Reasonably foreseeable future actions that would cumulatively impact salable minerals include new oil, gas, and potash development projects. The cumulative impacts would be both adverse and beneficial. Beneficial impacts would include the increased demand for salable minerals to support leasable mineral development. Adverse impacts would include the potential conflict of the locations of leasable mineral operations with the location of salable mineral deposits. The RFD estimates 480 new wells per year would be drilled on non-federal lands over the next 20 years. Thus an estimated 9,600 wells on non-federal land are projected. An estimated 7,000 acres of new potash development is also projected (see Table 4-239 above). The new leasable mineral infrastructure would remove surface lands needed to access salable mineral deposits. Location constraints may be placed on salable mineral operators as a result of future leasable development. However, given the large land base and widely available salable mineral deposits in the planning area, these conflicts are not expected to be severe.

As discussed under the direct and indirect impacts section for salable minerals, Alternative B would close or avoid the greatest number of acres to salable mineral development on BLM-administered lands. Therefore, cumulative impacts from location constraints placed on salable minerals on non-federal lands would be the greatest under Alternative B. The No Action Alternative would result in the least amount of acres closed or avoided for salable mineral development. Therefore, cumulative impacts resulting from location constraints placed on salable minerals on non-federal lands would be the least under the No Action Alternative.

4.6.13 Renewable Energy

Past and present actions that have impacted renewable energy include construction of the 345-kilovolt (kV) Roadrunner electric transmission line. Its completion provides an initial option for transmission of any future renewable energy projects. Completion in 2012 of the *Solar Energy Development Programmatic Environmental Impact Statement* identified only a single suitable solar energy zone (SEZ) in New Mexico, the Afton site located southwest of Las Cruces. Under the RFD scenario, the *Solar Energy Development Programmatic Environmental Impact Statement* predicted 833 megawatts (MW) generated on BLM-administered lands in New Mexico by 2030. The Afton SEZ contains nearly 30,000 developable acres, which would easily cover the RFD scenario estimate even if not completely built out. No suitable SEZs were designated in the planning area.

In September 2014, the BLM published a proposed rule to amend its regulations governing solar and wind ROWs. That proposed rule, expected to become final before the end of 2015, would create “designated leasing areas” where more favorable terms for development would be established. To date, developers have demonstrated a reluctance to pursue renewable energy projects on BLM-administered lands. However, should a streamlined compliance process be established with more favorable economic terms, developers might reconsider if sufficient transmission became available.

At present, no commercial solar or geothermal development has occurred on BLM-administered lands in the planning area. One wind project, Wildcat Wind (27 MW) has been constructed on non-BLM-administered lands within the planning area. A second 15-MW wind project occurs just outside the planning area in Chaves County (American Wind Energy Association 2015). Currently, a 100-MW solar project is being proposed in nearby Chaves County and at least one additional wind project of approximately 25 MW is being considered in Lea County on non-BLM-administered lands in the planning area. The solar energy developer is currently looking for additional private land development opportunities in the planning area (Eddy or Lea Counties) for up to another 200 MW of photovoltaic solar. It appears that there would be little difference among the various alternatives in regard to cumulative impacts of renewable energy. The No Action Alternative and Alternative D would result in more acres of surface disturbance associated with oil and gas development that when combined with any future renewable energy development would result in greater cumulative impacts.

Reasonably foreseeable actions include completion of transmission lines that would encourage additional wind and solar development. Current route plans for the SunZia and Southline transmission lines are located far enough away from the planning area that they would not appear to encourage new large-scale commercial renewable energy development. Other transmission corridors, if proposed by the Renewable

Energy Transmission Authority, within the planning area could also increase the demand for land to develop renewable energy projects. Additional proposed 345-kV lines such as the Excel Energy Tuco-Yoakum-Hobbs line could also encourage further energy development, with an appropriate market and pending approvals from the New Mexico Public Regulation Commission.

4.6.14 Livestock Grazing

Past and present actions within the planning area that affect and have affected livestock grazing are the result of activities and actions within the planning area that affect available forage. Surface-disturbing activities such as mineral development, ROW development, spread of noxious weeds and OHV use have reduced the amount of forage available for livestock grazing. Chapter 3, Section 3.3.3 provides greater details on the effect of past and present actions on livestock grazing.

Reasonably foreseeable actions that affect and have affected livestock grazing include oil and gas development, which has occurred across the planning area in the past and would continue into the future. Other surface-disturbing activities, such as ROW development and OHV use, could contribute to greater loss of available forage and, therefore, an increase in the number of AUMs lost, as would other surface-disturbing activities listed under reasonably foreseeable future actions. Table 4-239 provides a look at the reasonable foreseeable future actions for the planning area. These projects, excluding those for vegetation restoration, would result in a cumulative loss of forage equating to approximately 24,862 AUMs (prior to reclamation) across the planning area.

Approximately 270,000 acres of vegetation treatments and fire rehabilitation projects are planned in the reasonably foreseeable future actions (Table 4-239), and though may result in short-term adverse impacts, would ultimately contribute to cumulatively long-term beneficial impacts as additional forage for livestock grazing is made available. Additionally, the Restore New Mexico program would contribute to beneficial cumulative impacts as one million acres have been restored to historical, native vegetative communities (and another million planned for restoration), thereby increasing the number of acres of forage available to livestock and also the number of available AUMs.

Under all alternatives, livestock grazing would benefit from management prescriptions, in accordance with the Standards and Guidelines. Adherence to these standards would reduce many of the cumulative adverse impacts to livestock grazing from future actions. Under all action alternatives scheduled rangeland improvements in accordance with established priorities would be implemented, thereby increasing beneficial cumulative impacts to livestock grazing, including healthier rangelands absent of noxious weeds and increased forage availability.

In general, Alternatives A and B would be the most beneficial to livestock grazing, as it would close a substantially greater number of acres to grazing compared to Alternatives C and D. Alternatives A and B would also result in the least number of AUMs lost. Alternative D would be the least beneficial to livestock grazing and would result in the greatest increase of adverse cumulative impacts by excluding the least number of acres from grazing and also contributing to the greatest number of AUMs lost.

4.6.15 Travel and Transportation Management

Past and present actions that have impacted travel include opening new routes and areas to OHV use in response to an increasing demand for recreational OHV access, new minerals exploration and development routes, and land tenure and land authorizations access routes. Cumulative impacts to travel would occur primarily from actions that permit, limit, or restrict travel access or travel opportunities: permitted travel within the planning area would be beneficial; restrictions or limitations on travel would be adverse. Route expansion for OHV recreational use has been beneficial, but has also generated adverse impacts from over-crowding and use conflicts in some areas, as discussed in detail in Chapter 3, Section 3.3.4. Minerals exploration and development, and land tenure and authorization actions have been beneficial for travel by opening new routes for planning area travel access.

The reasonably foreseeable future actions that would affect travel management include oil and gas exploration and development of wells and access routes, oil and gas pipeline construction, and power line and utility corridor development. Hydraulic fracturing has opened new opportunities for oil and gas production in areas previously considered inaccessible or too costly. The impacts of these future projects on travel management, when considered with past and present actions, would be beneficial in the long term by incrementally increasing travel access and opportunities within the planning area. Alternative D would allow the highest degree of minerals development and would permit the least limitations on OHV travel access. When considered with past, present, and foreseeable future actions, this alternative would have the most beneficial impacts on travel management.

Under the proposed RMP, the other action alternatives (Alternatives A, B, and C) would have varying impacts on travel management when considered with past, present, and future actions. Alternatives A, B, and C would have roughly similar OHV travel designations for open, limited, and closed; however, Alternative C would allow more planning area acreage to be open to leasable, salable, and locatable minerals development, with more beneficial impacts to travel because of increased accessibility to OHV users. Thus, Alternatives A and B, when considered within the context of past, present, and future actions, would have the least beneficial impacts on travel management.

4.6.16 Recreation and Visitor Services

Past and present actions that have impacted recreation resources and recreational opportunities are oil and gas exploration and development and mining. Both of these types of activities have and are currently adversely affecting the quality of backcountry recreational opportunities and experiences by degrading scenic quality and by encroaching on popular backcountry recreation areas. These impacts are discussed in Chapter 3, Section 3.3.5.

Actions that affect scenic quality (a component of the recreational experience) and affect the expectations that recreation users have when they visit an area (e.g., solitude, naturalness, challenging or interesting OHV trails) would have an effect on recreation. Reasonably foreseeable future actions on recreation include pipeline construction, continuing oil and gas exploration and development, utility line construction, and mining. All of these actions would create surface disturbances and, along with past and current actions, adversely affect recreation resources by degrading scenic quality. The future expansion of construction of oil and gas infrastructure, utility corridors, and mining, along with past and existing actions, would adversely affect recreation resources within the planning area ERMAs by reducing the likelihood for naturalness, quiet, and solitude. Under the proposed RMP, Alternative B actions would have the least adverse effect on recreation from oil, gas, and other minerals development because foreseeable total oil and gas disturbances would be the least, and the highest acreage would be recommended for withdrawal from locatable and salable minerals development (see Section 4.3.1).

When considering the other action alternatives in the context of past, present, and future actions on recreation, Alternative A would have a lesser degree of adverse impacts on recreation because there would be fewer acres predicted for oil and gas development and more acreage proposed for withdrawal from locatable and salable minerals development. Alternative D would have the most adverse impacts on recreation because the predicted acreage available for future oil and gas development would be the greatest under this alternative and because the fewest acres would be proposed for withdrawal from locatable and salable minerals development. Alternative C would be similar to Alternative D.

4.6.17 Land Use Authorizations

Because land use authorizations are based on programmatic decisions, past and present actions that have impacted such authorizations are limited to past resource management planning wherein areas of avoidance, exclusion, or withdrawal from ROWs were designated. Individual past and present projects do not contribute to these impacts. As such, the cumulative effects of past actions on land use authorizations are reflected in the No Action Alternative currently under consideration.

Reasonably foreseeable actions such as those listed in Table 4-239 above would all require issuance of land use authorizations. Future development of lands surrounding the planning area is likely to also prompt requests for ROW authorizations across BLM-administered lands to serve and access those developments.

Under the current alternatives, the designation of ROW avoidance and exclusion areas on BLM-administered lands, along with similar restrictions on ROW development on adjacent lands would have a cumulative impact of reducing routing options for ROW facilities such as utilities and roads. Among the alternatives, the No Action Alternative would result in the least change from existing conditions and would place the fewest overall restrictions on issuance of such authorizations through exclusion, avoidance, and withdrawal of ROWs. As a result, this alternative would place the greatest demand on the CFO Lands and Realty program for processing ROW applications and permits. Among the action alternatives, Alternative D would implement the fewest restrictions on ROWs (i.e., would include the fewest acres excluded, avoided, or withdrawn from ROWs). Alternative B would result in the biggest net change to land use authorizations and reduce the demand on the program for processing of applications and permits by implementing ROW exclusion, avoidance, and withdrawal designations on the highest acreage of land in the planning area.

4.6.18 Land Tenure

Past and present actions that have impacted land tenure adjustments include land sales, purchases, and exchanges. Because land tenure adjustments are based largely on programmatic decisions, past and present actions that have impacted such adjustments were governed by past resource management planning wherein areas of disposal and retention were designated. Individual past and present projects generally do not contribute to these impacts. As such, the cumulative effects of past actions on land tenure adjustments are reflected in the No Action Alternative currently under consideration. Since 1988, land tenure adjustments have resulted in a net loss of approximately 59,900 acres of federal land in the planning area.

Of the reasonably foreseeable actions listed in Table 4-239 above, only one—the Carlsbad Municipal Schools project—would effect a land tenure adjustment. Under this action, 82 acres of BLM-administered land would be transferred out of BLM ownership under the R&PP.

The designation of ROW avoidance and exclusion areas on BLM-administered lands, along with similar restrictions on ROW development on adjacent lands, particularly National Forest lands, would have a cumulative impact of reducing routing options for ROW facilities such as utilities and roads.

The current alternatives would not, in general, add cumulatively to effects on land tenure but would change the management approach to tenure adjustments by varying the amount of land specifically designated for disposal or retention. By comparison to the No Action Alternative, all of the action alternatives would reduce the acres of land designated for disposal and increase the acres of land designated for retention. Among the action alternatives, Alternative D would designate the most lands for disposal and the most land for retention. Alternative A would designate the least land for disposal and the second most land for retention. As such, this alternative would result in the least amount of change in land ownership among the action alternatives, though the net differences between the action alternatives are relatively small.

4.6.19 Special Designations

Past and present actions that have impacted and reasonably foreseeable future actions that can affect special designation include surface disturbance related to mineral development, utility corridors, OHV use, fire suppression, and geophysical exploration. Under the No Action Alternative, existing special designations as ACECs, SMAs, RNAs, and ONAs would continue to be managed to protect the relevant and important values. Any past, present, or reasonably foreseeable future actions would not contribute any adverse cumulative effects under this alternative.

For Alternative A, the BLM would manage nine ACECs to protect the relevant and important values despite any past, present, and reasonably foreseeable future actions. For the six remaining areas not designated under this alternative, if developed, many of these areas would not retain their relevant and important

values. For Alternative A, the BLM would manage two WSR corridors as suitable for WSR designation. These areas would be managed to maintain their outstandingly remarkable values despite any past, present, and reasonably foreseeable future actions.

For Alternative B, the BLM would manage 15 areas as ACECs to protect the relevant and important values despite any past, present, and reasonably foreseeable future actions. Under this alternative, the BLM would manage one WSR corridor as suitable for WSR designation. This area would be managed to maintain its outstandingly remarkable values despite any past, present, and reasonably foreseeable future actions. For the remaining river corridor not managed as suitable for WSR status, if developed, it would not retain its outstandingly remarkable values.

For Alternative C, the BLM would manage eight areas as ACECs to protect the relevant and important values despite any past, present, and reasonably foreseeable future actions. For the seven remaining areas not designated under this alternative, if developed, many of these areas would not retain their relevant and important values. Under Alternative C, the BLM would manage one WSR corridor as suitable for WSR designation. This area would be managed to maintain its outstandingly remarkable values despite any past, present, and reasonably foreseeable future actions. For the remaining river corridor not managed as suitable for WSR status, if developed, it would not retain its outstandingly remarkable values.

For Alternative D, the BLM would manage five areas as ACECs to protect the relevant and important values despite any past, present, and reasonably foreseeable future actions. For the 10 remaining areas not designated under this alternative, if developed, many of these areas would not retain their relevant and important values. Under Alternative D, the BLM would manage the Black River as suitable for WSR designation. If developed, these river corridors would not retain its outstandingly remarkable values. Potential for adverse cumulative impacts to eligible specially designated areas would be the greatest under this alternative.

All alternatives would contribute no adverse cumulative impacts to WSAs because they are protected by law, regulation, and policy, and all alternatives would continue existing management of the Guadalupe Backcountry Byway.

4.6.20 Tribal Rights and Interests

The BLM CFO has limited information about the specific areas of significance to tribes within the planning area. Therefore, it is difficult to identify specific past, present, and reasonably foreseeable future actions that could result in cumulative impacts to tribal rights and interests.

Management decisions by other agencies and private entities that result in the degradation or removal of access to lands with tribal significance, including sacred site and TCPs would cumulatively impact tribal rights and interests. Degradation can include the disturbance of native land conditions considered significant to tribes, which can reduce the amount of land on which tribes can exercise their rights to hunt, gather, fish, and conduct ceremonies on non-federal land. Native plant communities, wildlife habitats, and cultural resource sites are more likely to be impacted from surface disturbance compared to areas left undisturbed. Therefore, mineral development, energy transmission, and transportation projects that result in surface disturbance have the potential to adversely impact tribal rights and interests, depending on the location of the projects in relation to tribally significant sites. Together, these activities could produce cumulative impacts to tribal rights and interest through incrementally impacting the condition of tribally important natural resources and the integrity and setting of sacred sites and TCPs. However, it is important to note that many of the projects listed in Table 4-239 above must comply with state and federal laws, EOs, and regulatory policies, as well as undergo government-to-government consultation with tribes prior to project implementation. As applicable during environmental review for these actions, tribal consultation would be conducted early in the planning process and input from tribes would be considered and incorporated into project planning and decision making, as appropriate. This implementation-level planning would address potential adverse impacts to tribal rights and interests at the project level.

Actions that conserve or restore those lands considered significant to tribes, such as the protection of high-value wildlife habitat and native vegetation restoration programs, could result in cumulative, beneficial impacts to tribal rights and interests. Projects listed in Table 4-239 above that could result in beneficial

impacts to tribal rights and interests are Restore New Mexico and the various fire and fuel treatment projects. These projects would work to restore previously disturbed areas or areas with non-native vegetation to encourage native vegetation growth. Depending on the location of the specific treatments, especially if they occur near TCPs or other sacred sites, tribal rights and interests would be beneficially impacted by restoration activities.

4.6.21 Social and Economic Conditions

Past and present projects and activities have largely defined the socioeconomic setting described in Chapter 3. Ranching was the primary activity leading to the initial development of the current communities in the analysis area. The construction of irrigation systems in the late 1800s fostered crop production in the area and the discovery of oil in the Hobbs oilfield in 1928 was a major factor in the growth and development of communities in the eastern portion of the SESA. The declaration of Carlsbad Caverns as a National Monument, and then a National Park, fostered the development of the area's tourism industry.

Among the categories of reasonably foreseeable future actions identified at the outset of this chapter, the following appear likely to have the largest and longest-term effects on social and economic conditions in the SESA:

- ongoing increases in motorized and non-motorized uses of BLM-administered lands;
- renewable energy development and development of utility corridors, pipelines and transmission lines; and
- continued expansion of mineral extraction activities, including oil and gas and potash development, including development on lands not administered by the CFO.

Demand for recreational uses of BLM-administered lands is expected to continue to grow in the future. This cumulative effect was considered in developing the projections of future recreation-related economic activity described earlier in this section. Increases in recreational use, coupled with increases in energy-related development activity discussed below, has the potential to create more opportunities for conflict between different user groups and individuals holding different values concerning the use and management of public lands.

Development of additional energy-related infrastructure, such as utility corridors, pipelines, and transmission lines, is likely to help foster development of renewable and conventional energy resources in the SESA and would continue to support the key role of energy-related activity in the regional economy.

According to the CFO's RFD, approximately 9,600 oil and gas wells are projected to be developed over the next 20 years on lands within the study area that are not managed by the CFO. This estimate is approximately 2.4 times the number of wells projected to be developed on CFO-managed lands under Alternative B (which has the fewest number of projected wells among the alternative) and about 1.6 times the number of wells projected for CFO-managed lands under Alternative D (which has the largest number of projected wells). Since the socioeconomic effects of well development and operation are essentially the same regardless of whether the well is on federal, state, or private lands, the cumulative economic and social effects from this level of energy development would be more than twice as large as the direct and indirect effects quantified in the socioeconomic section of this chapter. Cumulative effects would be largest under Alternative D (which involves the most projected wells on CFO-managed lands) and smallest under Alternative A. The cumulative extent of potential energy-related activity in the SESA would likely be welcomed by individuals that prioritize natural resource uses for economic development and would likely be a source of concern among individuals who prioritize resource protection.

Other factors outside the control of the residents and institutions within the SESA would also affect social and economic conditions in the future. For example, national and international supply and demand for energy would determine prices for oil, natural gas and other energy products. Variations in price levels, in turn, would affect both the rate of development of new wells and the level of energy-related employment and economic activity in the SESA. Given the SESA's economic dependence on energy-related activity, variability in energy prices and activity over time has the potential to create periods of economic instability throughout the study area.

4.6.22 Health and Safety

Cumulative impacts would be the same under all of the alternatives. The potential impacts would be due to management actions and planning within those lands surrounding the planning area, including the BLM Roswell, Las Cruces, and Oklahoma and Amarillo Field Offices, the Lincoln National Forest, and Carlsbad Caverns and Guadalupe National Parks. Minerals development within surrounding areas would increase the use, generation, and transportation of hazardous materials. City and county use plans for surrounding communities could have cumulative effects, whereby mineral resources are developed adjacent to BLM-administered lands. State lands that are surrounded by BLM-administered land could have impacts from inholding development. Hazardous materials are regulated by the EPA and administered by state agencies regardless of land status. The incremental contribution of the proposed RMP and the alternatives on the cumulative impacts to health and safety is anticipated to be minimal if all applicable laws, regulations, safeguards, and procedures are followed.

4.6.23 Land Use Impacts to Resource Resiliency in the Context of Climate Change

Climate change is affecting the southwestern United States with temperature increases of almost 2°F in the last century and further increases of 3.5°F to 9.5°F anticipated by the end of this century (Globalchange.gov 2016). Drought conditions are already common in the Southwest and drought periods are expected to become more frequent, intense, and longer. Drought will affect important water sources, including the Colorado River Basin. The Southwest Regional Climate Assessment has issued five key messages with respect to natural resource projections in the context of climate change in the southwestern United States (Globalchange.gov 2016):

1. Snowpack and streamflow amounts are projected to decline in parts of the Southwest, decreasing surface water supply reliability for cities, agriculture, and ecosystems.

2. The Southwest produces more than half of the nation's high-value specialty crops, which are irrigation-dependent and particularly vulnerable to extremes of moisture, cold, and heat. Reduced yields from increasing temperatures and increasing competition for scarce water supplies will displace jobs in some rural communities.

3. Increased warming, drought, and insect outbreaks, all caused by or linked to climate change, have increased wildfires and impacts to people and ecosystems in the Southwest. Fire models project more wildfire and increased risks to communities across extensive areas.

4. Flooding and erosion in coastal areas are already occurring even at existing sea levels and damaging some California coastal areas during storms and extreme high tides. Sea level rise is projected to increase as Earth continues to warm, resulting in major damage as wind-driven waves ride upon higher seas and reach farther inland. (Note: this key message is not applicable to the CFO).

5. Projected regional temperature increases, combined with the way cities amplify heat, will pose increased threats and costs to public health in southwestern cities, which are home to more than 90% of the region's population. Disruptions to urban electricity and water supplies will exacerbate these problems (Globalchange.gov 2016).

Water, vegetation, wildlife, cultural, air, and karst resources are identified as the resources most susceptible to climate change impacts in the planning area. Many CFO land uses will likely stress these resources even further and impact their resiliency. Resilience can be generally defined as the capacity of a resource to absorb stresses (e.g., land uses, climate change, etc.) and maintain function in the face of external stresses imposed upon it by (Wikipedia 2016). Common land uses in the planning area include those associated with leasable, salable, and locatable minerals (such as oil well pads, potash mines, and caliche pits), as well as land uses associated with land use authorizations (such as ROW power lines and pipelines). Other common land uses include grazing, OHV use, and other recreation uses. Resources identified as possessing a resiliency attribute include water, vegetation, soils, wildlife, riparian areas, and karst resources, and discussion of their resiliency to land use impacts in the context of a changing climate follows.

Given that cultural resources do not possess properties with the ability to recover once impacted, this resource class will not be further discussed in this section. For air resources, only ozone will be addressed; yet, resiliency of air quality is not fully understood and, for that reason, other air contaminants will not be discussed further in this section.

Table 4-242 represents anticipated land use impacts to each of these resources' resiliency in the context of a changing climate scenario as described above. In this table, an estimate of whether anticipated land uses will increase or decrease resource properties'/attributes' resiliency is made. Justification of these estimates of increase or decrease in resiliency is provided in some of the most current peer-reviewed science literature and is provided for each resource following the table.

Table 4-242. Anticipated Land Use Impacts to Resource Resiliency in the Context of Climate Change

	Groundwater	Soils	Vegetation	Karst	Wildlife	Riparian	Air
Leasable minerals	↓	↓	↓	↓	↓	↓	↓
Locatable minerals	↓	↓	↓	↓	↓	↓	↓
Salable minerals	↓	↓	↓	↓	↓	↓	↓
Land use authorizations	↓	↓	↓	↓	↓	↓	–
Renewable energy	↓	↓	↓	–	↓	↓	↑
Grazing	↓	↓	↓	↓	↓	↓	↓
OHV use	↓	↓	↓	↓	↓	↓	↓

↑ = increase in resource resiliency due to land use.
↓ = decrease in resource resiliency due to land use.

4.6.23.1 Groundwater/Surface Water

Water use and groundwater draw are primary issues of concern in the Southwest. Direct climate change impacts on groundwater quantity are anticipated to be minimal when compared to groundwater use (Friggens et al. 2013). On the other hand, riparian areas are expected to be impacted significantly by predicted warming and reduced precipitation trends. Warming trends will cause seasonal peak flows to occur earlier and snow packs to be reduced (Hurd and Coonrod 2008; Friggens et al. 2013). Given that the Pecos River receives a portion of its water from springs issuing from the Capitan Aquifer, decreased precipitation would result in a decrease in Pecos River flow. This change in surface flows likely will result in a greater reliance on groundwater by surface water users, thereby impacting aquifers beyond what is being observed currently (Friggens et al. 2013). Evaporation and lower flows may also result in increased salinity concentrations in waterways such as the Pecos River (Yuan and Miyamoto 2005, 2008).

In sum, increased demand on water resources "due to human population growth and increased municipal, agricultural, and industrial use can exacerbate climate-driven scarcity" (Nelson et al. 2013). Counties found to be "most at risk for water sustainability are found in the West, Southwest, and Great Plains (Roy et al. 2012). Moreover, water resources in southeast New Mexico, including Eddy, Lea, and Chaves Counties, are predicted to be severely impacted by climate change (Roy et al. 2012). For example, the amount of estimated freshwater withdrawal as a percentage of available precipitation is expected to be greater than 500% by 2050 (Roy et al. 2012). And, in a climate change scenario, Eddy, Lea and Chaves Counties are categorized as "Extreme" and "High" in the authors' Water Supply Sustainability Risk Index (2050) map for a climate change scenario (Roy et al. 2012).

It should be noted that the amount of withdrawal used in the Roy et al. (2012) study only accounts for domestic use, agricultural irrigation use, and thermoelectric cooling and does not include water extraction for hydraulic fracturing or potash operations. Projections from the RFD scenario has water used for hydraulic fracturing increasing from 5.4% to 17% of the total mining waters used in the state of New Mexico (total mining waters comprise 1% of the total waters available in New Mexico) (Engler and Cather 2014). Additional land uses such as hydraulic fracturing could create impacts that would make groundwater

recharge volumes less resilient under an already extreme climate change scenario. However, the oil and gas industry's reliance on surface water resources and recycling of fracturing fluids and/or produced water rather than the use of fresh groundwater resources would cause little cumulative impact on groundwater availability. Potash mining operations would continue to stress the Ogallala Aquifer. For glacially recharged aquifers such as the Dewey Lake/Santa Rosa hydrostratigraphic aquifer, less precipitation would exacerbate the net loss of water volume in the aquifer from industrial, agricultural, and domestic use.

4.6.23.2 Vegetation

Climate change is expected to cause shifts in distribution of plant species and cause changes in spring phenology (Brandt et al. 2013; Brusca et al. 2013; Harsch et al. 2016; Ishioka et al. 2013; Krause et al. 2015). These changes are expected in vegetation communities and for single species, such as rare endemic plants. With these shifts, physical properties (e.g., soil type) could limit vegetation movement or adaptation and ultimately further reduce resilience.

Land uses pertaining to energy development, potash mining, grazing, etc., could reduce the resilience of vegetation and rare plants in the face of climate change. These resource uses may increase disturbance across the landscape by impacting pollinator habitat, increasing non-native species invasion, and reducing community connectivity, which in-turn amplifies the impacts of climate change and reduces resiliency. More research is needed to determine how specific uses might cumulatively impact vegetation communities and rare plants.

4.6.23.3 Soil

One predicted consequence of climate change in the Southwest is a decrease in vegetation production, which would result in increased erosion (Friggens et al. 2013). Additionally, a hotter and dryer climate would result in a higher frequency of severe disturbance such as wildfires. Burned areas devoid of vegetation would increase the likelihood of erosion from wind and water (Enquist and Gori 2008). Wildfires may also trigger "abrupt ecosystem transitions" that result in alterations to vegetation and "geomorphic, soil, hydrological, and biogeochemical systems" (Friggens et al. 2013 pg. 35).

Common land uses in the field office, such as grazing, oil and gas development, potash mining, and OHV use result in the de-stabilization of soils. Continuing these land uses will exacerbate the erosion predicted from climate change.

4.6.23.4 Wildlife

The Southwest, including the CFO planning area in southeastern New Mexico, is an area of high biodiversity and includes a number of endemic species. With climate change, major changes in the structure and species composition of southwestern plant communities are anticipated due to increasing temperatures and altered precipitation patterns. Seasonal and interannual variations in climate also influence many phenological events (e.g., flowering, migration, emergence, reproduction) in floral and faunal species. Therefore, climate influences species distribution and abundance through changes in resource availability, fecundity, and survivorship. It is currently unknown which species will have the capacity to adapt to a changing climate. For example, whether or not a species can migrate under an altered climate will be strongly influenced by its dispersal abilities and land use and habitats. Wildlife and plant responses to regional climate change will be highly dependent on feedbacks among weather, land cover, hydrology, fire, and invasive species.

4.6.23.4.1 Distribution

Many species' distributions will shift poleward due to increasing temperatures from climate change (Rosenzweig et al. 2007). Other studies, however, indicate that distributional shifts are likely to be multi-directional due to complex interactions among temperature, precipitation, and species-specific physiological tolerances (VanDerWal et al. 2013). Some species will experience a range expansion, others a reduction or a shift into less hospitable habitat. Some species may have nowhere to go because they are already at the northern limit of their habitat (EPA 2016b).

Other species may not have the adaptive capacity to keep up with a large magnitude and/or rapid rate of climate change, leading to severe range contractions and an increase in extinction risk (Hoegh-Guldberg et al. 2008). For some ecosystems, shifts in distribution will have far greater impacts than just the addition or subtraction of a species. Some range shifts are anticipated to have cascading effects on community structure and the functioning/stability of ecosystems (Lawler et al. 2009).

4.6.23.4.2 Habitat Quality

Climate change may produce a number of physical impacts to ecosystems, which may in turn affect the quality of plant and animal habitat. This may occur through a decrease in available water or other hydrological changes, or changes in vegetation type through severe drought or fire. Large areas of Chihuahuan grassland that were once suitable habitat for many species may no longer be suitable, potentially leading to significant changes in species composition due to loss of significant habitat components (Baez and Collins 2008). These communities may also experience a reduction in stability, which may have far-reaching consequences for biodiversity and ecosystem functioning (Baez and Collins 2008).

4.6.23.4.3 Phenological Events

Climate change has led to shifts in phenological events (the timing of natural, biological events) in many species distributed widely across taxonomic groups. Phenological events include fruit ripening, leaf coloring, bird migration, amphibian chorusing, and insect emergence (Rosenzweig et al. 2007).

In reptiles and amphibians, climate change may affect reproduction and dispersal (Blaustein et al. 2010). Trends toward earlier breeding have been observed in multiple species of amphibians across the globe, and these appear to be linked to changes in temperature and precipitation (Blaustein et al. 2010). Because the date and abundance of flower blooms are highly correlated with winter snowpack, projected declines in snowpack will decrease flower abundance and advance the date of flowering. Earlier flower blooms could have substantial impacts on plant and animal communities in southwestern deserts, especially on shrubs and migratory hummingbirds. Impacts are also possible to the migration and dispersal routes of many species, including migratory birds and bats (Skirp 2015).

4.6.23.4.4 Fragmentation and Isolation

Fragmentation and climate change are two human-influenced impacts considered to be the main threats to biodiversity globally (Klapwijk and Lewis 2012). Fragmentation can change the structure and function of ecological communities by altering the demography of populations, as well as individual behavior and genetics. Climate change further fragments habitat and creates barriers to migration, which can result in a decrease in a species' total range or a shift in range. Range shifts will alter the composition and structure of ecological food webs. Attempts to redistribute to more favorable habitats may be hampered by fragmentation, which can prevent species movements, potentially contributing to species extinction (Rosenzweig et al. 2007).

Indirect effects on species' interactions may also be harsh, impacting the structure and function of ecological communities. Disruption of feeding interactions (between predators and prey, herbivores and plants, and hosts and parasites) will lead to changes in the outcome of competitive interactions and altered probabilities of persistence for individual species. Both range shifts in response to climate change and habitat fragmentation will alter the composition and structure of ecological food webs, although predicting the consequences of such changes is problematic (Klapwijk and Lewis 2012).

Climate change induced variation in temperature and precipitation will directly affect rangeland plant production and wildlife habitat. Changes in climate may affect the vitality, productivity, and structure of rangeland plants, resulting in a decrease in overall conditions of both wildlife habitat and range condition. Higher temperatures and decreased precipitation will also decrease forage production and lengthen the growing and grazing season for ranching, resulting in increased competition with livestock for accessible natural vegetation and increasing the risk of disease.

Land uses such as grazing, recreation and OHV use, oil and gas development, land use authorizations, and renewable energy will reduce the resilience of wildlife in the face of climate change by increasing habitat fragmentation, habitat loss and alteration, barriers to migration, and human-wildlife conflict, potentially resulting in a decrease in biodiversity. Much habitat is lost to oil and gas development and infrastructure (Riley et al. 2012). Associated construction processes can cause erosion of dirt, minerals, and other harmful pollutants into nearby water sources, thereby degrading the clean water that wildlife depend upon for survival. Unconventional oil and gas development also poses contamination risks to surface waters through spills and leaks of chemicals, diesel fuel, and wastewater, putting surface water and wildlife at risk. Roads can alter the hydrology of a site, and OHV activity can compact soils, crush plants, and provide a means for non-native plant species to invade otherwise remote, intact habitats. Construction, mine operation, improvements and use of transportation routes, and installation of power lines have contributed to the loss of habitat due to mining activities and disturbance. As outdoor recreation increases due to higher temperatures, opportunities for impacts to individuals and wildlife habitat increase as well. The utility-scale development of renewable energy sources and related transmission facilities on can threaten wildlife, habitats and associated ecosystems. For example, wind farms produce electricity with wind, but the blades that generate electricity can kill large numbers of bats and birds, potentially leading to population declines (Cohn 2008). The turbulence and barometric air pressure changes caused by the moving blades also can cause serious injury and death to bats (Maupin et al. 2014). Impacts also include habitat loss and fragmentation due to development of the site and the road system, vegetation removal, and installation of supporting structures. ROWs may destroy, fragment, and degrade wildlife habitat, and present barriers to migration. A loss of key species may result in negative cascading effects on community structure and ecosystem function, with an associated loss in ecosystem services. The combined impacts from climate change and land uses will result in a decrease in overall conditions of wildlife habitat, forage production, and water availability and quality, thereby also decreasing the resiliency of many wildlife.

4.6.23.5 Riparian Areas

Riparian areas are expected to be significantly impacted by warming and a decrease in average annual precipitation, which will cause seasonal peak flows to occur earlier and snowpack to be reduced (Hurd and Coonrod 2008; Friggens et al. 2013). Given that the Pecos River is recharged, in part, by the Capitan Aquifer (Uliana 2001), decreased precipitation and subsequent pumping for irrigation, domestic use, etc., reduces the water table, which then results in decreased Pecos River flow. The problem is exacerbated when farmers and ranchers with supplemental wells sell their well water for commercial use, a practice that may be unsustainable (Romm 2013). Areas of significant aridity such as the Chihuahuan Desert may present particular challenges if water use draws down groundwater below the roots of desert riparian vegetation. To protect riparian ecosystems, land managers and water users will need to collaborate to ensure that riparian ecosystems maintain adequate flows.

Fish, insects, and other aquatic species all have a preferred temperature range (Coutant 1999). Climate change is projected to result in higher surface water temperatures, which, in combination with anticipated land use changes, may create problems in streams (Nelson and Palmer 2007). Temperature increase alone could induce profound species community transformations (Nelson and Palmer 2007). Climate change can significantly modify (disrupt) the distribution and population of aquatic organisms as water temperatures in some streams are already reaching the lethal limit fish (Eaton et al. 1995).

Riparian ecosystems contribute to ecological resilience for the region because they are naturally resilient, provide linear habitat corridors, and create thermal refugia (Seavy et al. 2009). Riparian habitats become more important to wildlife and riverine functions as the climate dries and warms. As the riparian ecosystem is impacted by the loss of precipitation and recharge from the aquifers, the ecosystem loses resiliency and the ability to extend that resiliency to surrounding areas. Anticipated land uses that affect groundwater draw or occur within riparian areas will have a detrimental effect on riparian areas.

4.6.23.6 Sand Shinnery Ecosystem

Sand shinnery is a peculiar subset of short grass prairie, which is co-dominated by grasses and a species of oak (shinnery oak) that grows predominantly under the surface of the sands. Sand shinnery communities extend across the southern Great Plains occupying sandy soils in portions of north and west Texas, west Oklahoma, and southeast New Mexico. Most of Eddy, Lea, and portions of Chaves Counties are dominated by sand shinnery habitat and are intermixed to a lesser degree with mesquite. Although the sand shinnery may be one of the nation's largest stands of oak with 5 to 7 million acres in the southern Great Plains (Peterson and Boyd 1998), the ecosystem is at risk.

Precipitation varies within the range of sand shinnery with an annual average of 12.4 inches occurring in Eddy County (Peterson and Boyd 1998). In southern New Mexico, April through June are generally dry and July through September relatively wet, with many grasses not beginning their growth until July. Snowfall in the southern shinnery averages less than 6 inches per year and none falls in some winters. Because water availability is a limiting factor for plant growth in this community, decreased precipitation from climate change may have major impacts to shinnery vegetation.

Shinnery oak grows leaves and flowers in April–May, typically 2 weeks before neighboring grasses and forbs, giving it a competitive edge. It also is able to store water, another competitive advantage over grasses and forbs. With increased temperatures and less precipitation, shinnery oak's phenology could be impacted, reducing its competitive advantage over other vegetation. During drought conditions, shinnery oak may not leaf out in the spring or may lose its leaves; however, shinnery oak can leaf out later in the growing season if water becomes available. Drought can modify or transform the community; therefore, prolonged periods of increased temperatures and/or decreased precipitation due to climate change may negatively impact shinnery oak.

Wildlife of the sand shinnery include dunes sagebrush lizard, which is endemic, and lesser prairie-chicken, which is restricted to shinnery and similar sagebrush, shortgrass- and mixed-grass prairie grasslands (Elmore et al. 2009). Despite moderate changes, compared to other estimates, Grisham et al. (2013) expected that clutch size would increase, but ultimately and with high certainty the nest survival would decrease to a level below the threshold for population persistence by 2050. Being at the drier edge of the range, shinnery oak may be displaced by desert as the climate becomes drier and the overall range of the species could diminish.

Shinnery ecology is robust when disturbed by grazing but is limited by the availability of precipitation (Peterson and Boyd 1998). Habitat fragmentation and loss from activities such as oil and gas development may make the ecosystem more brittle when added to the impacts associated with climate change.

4.6.23.7 Karst Resources

The CFO manages approximately 2.5 million acres of federal lands, of which over 1 million acres is karst terrain. Karst terrain is a landscape formed in soluble rock types such as limestone, dolomite, gypsum, and salt. In karst terrains there are few if any surface streams because the water moves rapidly underground through fractures and open conduits that are solutionally widened. Other features commonly found in karst landscapes are closed depressions (sinkholes), swallets, sinking streams, karst resurgences, and caves. Aquifer recharge is primarily from meteoric water.

There are three primary karst aquifers in the planning area. Possibly the most important is the Capitan Reef aquifer. It provides 98% of the drinking water for the city of Carlsbad and 100% of the water for Whites City (City of Carlsbad Water Department 2016).

Other important karst aquifers are the Rustler and the Castile Formations. The Rustler Formation is composed of interbedded gypsums and dolomites. It extends over a large portion of the planning area and provides primary water sources for the communities of Otis and Loving, along with several ranching communities. The Castile Formation is located southeast of the Guadalupe Mountains in the Delaware Basin and is composed of Permian-age gypsum. The formation gives rise to several springs that support riparian habitat and is the water source for the ranching community there.

The general effect of climate change on the southwestern United States will be a drier and warmer climate. The impact of that effect on the cave and karst environments could be multi-fold. With the increased desertification of the karst landscape there would be less recharge of the aquifers. This would then result in decreasing water levels in the karst aquifers, which would in turn result in decreased outflow from karst springs and a diminishing of the riparian habitat associated with those springs. For the cave ecosystems, the result would manifest in decreased moisture in the system. Drier cave ecosystems would stress the troglobitic wildlife. Continued depletion of karst aquifers would jeopardize any troglobitic aquatic species. There have been two new species of troglobitic aquatic species discovered in the Rustler karst aquifer and more may exist as biologic inventories continue (Mace and Wade 2007; Veni 2014). Drier climates would also slow the infiltration of meteoric water from the surface into the cave systems. This would slow the growth of the speleothems.

As climate change progresses there will still be a domestic and industrial demand for water resources. The primary uses form karst aquifers would be for domestic city use. A second high demand would come from industrial use, which includes the oil and gas industry and the potash industry. Water use associated with the oil and gas industry for drilling and hydraulic fracturing is from 3.5 to 4.5 million gallons per well. With hundreds of wells proposed for drilling in karst areas in the planning area, there is a potential for depletion of aquifer drawdown with volumetric resilience being low. However, the oil and gas industry's reliance on surface water resources and recycling of fracturing fluids and/or produced water rather than the use of fresh groundwater resources would cause little cumulative impact on groundwater availability. Most of agricultural use comes from the Pecos River with only a small amount coming from supplemental wells drawing from karst aquifers. The potash industry gets most of its water for processing ore from the Ogallala Aquifer. One of the new recovery techniques is solution mining that requires 3.77 million gallons of water per day but drawn from the Rustler Formation (BLM 2012f).

Sustained or increased domestic and industrial/agricultural use of water from karst aquifers would add to the strain of already stressed cave and karst ecosystems.

4.6.23.8 Air Resources

Ozone in the atmosphere warms the climate and particulate matter can have either have either a warming or cooling effect (EPA 2016b).

Conversely, climate changes can impact air quality. A warming climate associated with climate change can potentially increase ground-level ozone concentrations on a regional basis. This could present future problems for compliance of ozone standards and cause ozone concentration exceedances. Without accounting for climate change effects, models indicate that, by 2021, areas may be in exceedance of the new ozone standard of 70 ppb due to foreseeable development (see Chapter 4, Section 4.2.11.8.3, Impacts from the Alternatives). Combined with climate change, even greater exceedances leading to non-attainment are likely to occur.

The impact of climate change on other air pollutants is less certain (EPA 2016b). Research is ongoing to better understand the influence of climate change on fine particulate matter and other air pollutions, as well as the interactions between naturally emitted compounds and human-made pollutants in the atmosphere (EPA 2016b).

Chapter 5:

Consultation and Coordination

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Chapter 5: Consultation and Coordination

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5.1 INTRODUCTION

This chapter details the Bureau of Land Management's (BLM) Carlsbad Field Office's (CFO's) consultation and coordination efforts during the planning process. The BLM is required by the Federal Land Policy and Management Act (FLPMA) to involve federal, state, local, and tribal agencies; organizations; interest groups; and the general public to ensure that 1) the most appropriate data have been gathered and employed for the analyses; 2) agency and public concerns are considered and incorporated into the planning process; and 3) paperwork and delays are reduced (40 Code of Federal Regulations [CFR] 1500.4-5). Coordination is both formal and informal and consists of written communications, workshops, meetings, phone interviews, person-to-person contact, online and electronic notifications, and press releases in local newspapers and newsletters.

From the beginning of the Resource Management Plan/Environmental Impact Statement (RMP/EIS) process, the CFO hosted public involvement meetings, held cooperating agency meetings and workshops, and published newsletters to help identify issues to be addressed in developing a full range of land management alternatives. Table 5-1 lists public involvement, coordination, and consultation events.

Table 5-1. Public Involvement, Coordination, and Consultation Events

Date	Location	Event
July 19, 2010	Artesia, New Mexico	Public Scoping Meetings (2)
July 20, 2010	Carlsbad, New Mexico	Public Scoping Meetings (2)
July 22, 2010	Hope, New Mexico	Public Scoping Meetings (2)
July 26, 2010	Jal, New Mexico	Public Scoping Meetings (2)
July 27, 2010	Hobbs, New Mexico	Public Scoping Meetings (2)
November 15, 2011	Carlsbad, New Mexico	Social and Economic Workshop
November 16, 2011	Hobbs, New Mexico	Social and Economic Workshop
February 1, 2012	Carlsbad, New Mexico	Special Designations, Visual Resources, Travel Management Workshop
February 2, 2012	Artesia, New Mexico	Special Designations, Visual Resources, Travel Management Workshop
July 16–August 2, 2012	Various Locations	Tribal Consultation Meetings (7)
November 13–14, 2013	Carlsbad, New Mexico	Cooperating Agency Workshop/Alternatives Development
July 8, 2014	Carlsbad, New Mexico	Lands with Wilderness Characteristics Workshop
July 9, 2014	Artesia, New Mexico	Lands with Wilderness Characteristics Workshop

5.2 PUBLIC INVOLVEMENT

5.2.1 Public Scoping

The BLM published a Notice of Intent (NOI) to develop the Carlsbad RMP/EIS in the *Federal Register* on June 10, 2010. The NOI formally began the scoping process. The BLM submitted a news release to local media and the Associated Press, and developed a website devoted to the RMP revision. The BLM also mailed a notice to a customized list of contacts maintained by the CFO.

The CFO hosted 10 public scoping meetings where the public was encouraged to submit oral or written comments regarding management of BLM-managed lands in the planning area (Table 5-2). Two meetings were held at each venue, with the first meeting held from 1:00 to 4:00 p.m. and the second meeting held from 6:00 to 9:00 p.m.

Table 5-2. Public Scoping Meeting Attendance

Meeting Date	Meeting Location	Number in Attendance
July 19, 2010	Artesia High School Auditorium, Artesia	9
July 20, 2010	Pecos River Convention Center, Carlsbad	17
July 22, 2010	Hope Community Center, Hope	9
July 26, 2010	Jal Community Center, Jal	7
July 27, 2010	New Mexico Junior College, Hobbs	29
	Total	***71***

The meetings included a formal presentation followed by an "open house" period. The presentation included an overview of the BLM and the CFO, the planning process, the purpose of scoping and encouraged attendees to ask questions and provide comments. The open house included presentation boards and maps, as well as a geographic information system (GIS) display. CFO specialists were available to answer questions and take verbal comments.

The formal scoping period ended on August 30, 2010, 30 days after the last public meeting. All comments received during scoping are available in the Final Scoping Report (BLM 2011).

5.2.2 Website

The BLM established the Carlsbad RMP website (https://www.blm.gov/programs/planning-and-nepa/plans-in-development/new-mexico/carlsbad-rmp), which is linked from the CFO's main website, in June 2010. The RMP website is updated regularly and includes postings of all RMP-related news releases, information about the planning process, an RMP schedule, and BLM contact information. Examples of RMP-related documents available on the website in PDF format include the following:

- Reasonably Foreseeable Development Scenario
- Preparation Plan
- Plan Schedule
- Preliminary Planning Criteria
- Federal Register Notice
- News Releases
- Wild and Scenic River Eligibility Report
- Wild and Scenic River Suitability Report
- Map of the planning area
- Final Scoping Report
- Scoping Comments
- Scoping Meeting Handout
- Socioeconomic Workshop Summary and Information
- Visual/Travel/Special Designation Workshop Information

The Carlsbad RMP website is updated at key milestones to provide the most recent planning information to the public.

5.2.3 Newsletters

In an effort to keep cooperating and coordinating agencies, tribes, and interested groups and individuals informed on the planning progress, planning issues, and upcoming public outreach efforts, the CFO published periodic newsletters. These newsletters were sent via mail and electronic mail to the RMP-specific mailing list maintained by the CFO. The following newsletters have been published during the development of the Draft RMP/EIS:

- November 2011
- May 2012
- December 2012
- June 2013
- December 2013
- June 2014
- April 2015
- July 2016

To be added to the mailing list to receive the newsletters, please contact the BLM:

- Email: blm_nm_cfo_rmp@blm.gov
- Fax Attention To: RMP Project Team Lead, Fax #: 575-234-5927
- Mail: BLM, Carlsbad Field Office, RMP Project Team Lead, 620 E Greene St., Carlsbad, NM 88220

5.2.4 Public Meetings

In addition to the 10 scoping meetings, multiple public workshops were held during the development of the Draft RMP/EIS to inform the public of the planning status and to obtain comments from the public.

Two Social and Economic Workshops were held on November 15 and 16, 2011, in Carlsbad and Hobbs, respectively, to discuss the issues related to the local economies and social conditions of the counties, towns and cities in the planning area and the role public lands serve in those economies. Twenty-three people attended the workshops. Comments received demonstrated interest in the following topics:

- Livestock grazing and the source for livestock feed
- Diversification of local economies from farm employment to other industries
- Housing shortages caused by increased employment opportunities
- The potential future expansion of Waste Isolation Pilot Plant
- The importance of oil and gas, potash, and grazing industries in the area
- Potential conflicts among resources uses
- Importance of heritage values, such as hunting and fishing
- The need for more leasable land for the mining industry
- Visual aesthetics
- Potential economic impact resulting from the listing of new federally protected species
- BLM-managed land disposal process

On January 18, 2012, the CFO presented to the Pecos District Resource Advisory Council (RAC). The RAC includes a panel of mixed expertise and balanced interests ranging from natural resources and Native American culture to energy and mineral development. The group provides input on BLM decisions from local community members, concerned citizens, and government officials of all levels. The CFO will continue to brief the members of the Pecos District RAC about the RMP revision and seek input on the planning process.

Four public workshops were held on February 1 and 2, 2012, to discuss the potential management alternatives for special designations, visually sensitive areas, and BLM transportation routes within the planning area. Two workshops were held in Carlsbad at the Pecos River Conference Center (February 1, 2012) and two were held in Artesia at the Fairgrounds Community Center (February 2, 2012). Both workshops covered the same topics. Thirty-seven people attended the workshops in Carlsbad, and 23 people attended the workshops in Artesia. Most of the comments received at all four workshops focused on travel management and were specifically related to the management of and improvements to the Hackberry Lake Off-Highway Vehicle (OHV) Area. Other comments concerned oil and gas development, special designations, visual resources, and livestock grazing.

Four public workshops were held on July 8 and 9, 2014, to discuss lands with wilderness characteristics, including the BLM's policy for these lands and the results of the inventory conducted for the RMP. Two workshops were held at the National Cave and Karst Research Institute in Carlsbad (July 8, 2014) and two were held at Central Valley Electric Cooperative in Artesia (July 9, 2014). Both workshops covered the same topics. Thirty-four people attended the workshops in Carlsbad, and 49 people attended the workshops in Artesia.

Other public meetings where the RMP was presented and discussed include:

- Multiple use interface with ranching community, oil and gas and potash industry (Carlsbad, May 4, 2011)
- Public Lands Advisory Council (Roswell, February 9, 2012)

Public meetings are also planned to present the Draft RMP/EIS and to provide opportunity for the public to comment on the document. Check the BLM's RMP webpage for public meeting times and locations.

5.3 CONSULTATION AND COORDINATION

This section describes consultation and coordination with federal, state, and local agencies, as well as tribal entities.

5.3.1 Cooperating Agencies

Cooperating agency status provides a formal framework for government agencies to engage in active collaboration with a federal agency to implement the requirements of the National Environmental Policy Act (NEPA). Federal and state agencies and local and tribal governments may qualify as cooperating agencies if they have "jurisdiction by law or special expertise" (40 CFR 1501.6 and 1508.5). The BLM invited 40 agencies and tribes to participate as cooperating agencies during the scoping period. On September 24, 2010, the BLM hosted a meeting with the invited agencies to discuss the role of cooperating agencies in the RMP process.

To date, 12 agencies signed memorandums of understanding to formalize the cooperating agency relationship:

- Bureau of Reclamation
- Carlsbad Irrigation District
- Carlsbad Soil and Water Conservation District
- City of Eunice
- City of Jal
- Chaves County
- Department of Energy
- Eddy County
- Lea County Water Users Association
- Natural Resources Conservation Service
- New Mexico Department of Game and Fish
- National Park Service

The U.S. Geological Society and New Mexico Environment Department indicated they wish to be involved in the RMP process informally.

The CFO formally invited the cooperating agencies to participate in developing the alternatives considered within the RMP/EIS and to provide data or other information relative to their agency responsibilities, goals, mandates, and expertise. Cooperating agencies provided input during the initial scoping process. The CFO held an alternatives development workshop with cooperating agencies on November 13 and 14, 2013, to discuss RMP goals, objectives, and draft alternatives. Cooperating agencies were invited to ask questions, provide input, and provide their perspective on resource management issues within the planning area.

5.3.2 Section 7 Consultation

The Fish and Wildlife Coordination Act of 19345 (16 United States Code [USC] 661 *et. seq*.), as amended, and the Endangered Species Act of 1973 (16 USC 1531 *et seq*.) require consultation with the U.S. Fish and Wildlife Service (USFWS) before initiation of any BLM project that has the potential to affect any federally listed, special status species or its habitat. Because the RMP revision is considered a major federal action, the CFO will initiate consultation with the USFWS.

To date, the CFO has consulted with the USFWS informally regarding the RMP process. The USFWS has an employee embedded in the CFO to assist with issues involving federally listed species. Although not a formal cooperating agency, the USFWS was represented at the alternatives development workshop with cooperating agencies on November 13–14, 2013.

Formal consultation will not begin until the CFO submits a Biological Assessment to USFWS for review and concurrence.

5.3.3 State Historic Preservation Office Consultation

Section 106 of the National Historic Preservation Act (NHPA; 54 USC 306108) requires federal agencies to take into consideration the effects of their undertakings on historic properties. Development of land use plans are considered "undertakings," and some decisions may have the potential to adversely affect historic properties. The BLM initiated contact with the New Mexico State Historic Preservation Office (SHPO) in

2010 when the SHPO was invited to become a cooperating agency. Although the SHPO did not sign a cooperating agency memorandum of understanding, the BLM has consulted informally with the SHPO throughout the development of the Draft RMP. The BLM has initiated formal consultation through written correspondence to determine whether they will choose to consult, and whether the RMP is an undertaking with the potential to adversely affect historic properties.

5.3.4 Tribal Consultation

The following seven tribes have traditional uses in the planning area:

- Apache Tribe of Oklahoma
- Comanche Indian Tribe
- Hopi Tribal Council
- Kiowa Tribe of Oklahoma
- Pueblo of Isleta
- Mescalero Apache Tribe
- Ysleta del Sur Pueblo

On August 21, 2010, the BLM sent a letter to each tribe to invite and encourage them to become cooperating agencies. The BLM followed up with a telephone call and an invitation to meet in person. Face-to-face meetings were held during the months of July and August 2012 with the various tribes. These meetings were to discuss the RMP revision and other projects within the CFO planning area. Table 5-3 provides a list of meetings held to collect information from tribes regarding their concerns or issues associated with CFO projects.

Table 5-3. Tribal Meetings Held to Discuss RMP Revision

Tribal Entity	Meeting Date	BLM Attendees	Tribal Attendees
Apache Tribe of Oklahoma	July 16, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Chairman Donald Cabaniss, Jr.; three members of Tribal Council
Kiowa Tribe of Oklahoma	July 17, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Chairman Ron Twohatchet
Comanche Indian Tribe	July 18, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Jimmy Arterberry, THPO / NAGPRA Director
Mescalero Apache Tribe	July 20, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Holly Houghton, THPO; Arden Comanche, Cultural Advisor
Ysleta del Sur Pueblo	July 24, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Javier Loera, War Captain / THPO
Pueblo of Isleta	July 25, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Governor Frank Lujan; 11 members of the Isleta Cultural Committee
Hopi Tribe	August 2, 2012	Jim Stovall, CFO Manager; George MacDonell, CFO Assoc. Manager; James Smith, CFO Lead Archaeologist	Leigh Kuwanwisiwma, Director of Cultural Preservation Office; Terry Morgart, THPO

THPO = Tribal Historic Preservation Office; NAGPRA = Native American Graves Protection and Repatriation Act.

As of the publication of this document, none of the tribes have opted to become cooperating agencies nor have they provided comment to the CFO regarding the RMP revision. Government-to-government consultation with the tribes will continue throughout the RMP process.

5.4 DISTRIBUTION LIST

The CFO distributed the Draft RMP/EIS to the agencies and organizations listed in Table 5-4 and tribes listed in Section 5.3.3 Tribal Consultation for their review and comments. Approximately 90 individuals and 100 businesses also received a copy of the Draft RMP/EIS or received notice that the document was available for review on the CFO website. Refer to the Administrative Record for the complete Draft RMP/EIS distribution list.

Table 5-4. Draft RMP/EIS Distribution List

Federal Agencies	**Elected Officials**
Bureau of Indian Affairs	Carlsbad City Council
Bureau of Reclamation	Chaves County Commissioners
Department of Energy	Eddy County Commissioners
Environmental Protection Agency	Lea County Commissioners
Federal Highway Administration	New Mexico Rep. Donald Bratton
National Park Service	New Mexico Rep. Cathrynn Brown
Natural Resource Conservation Service	New Mexico Rep. William Gray
U.S. Fish and Wildlife Service	New Mexico Rep. David Gallegos
U.S. Forest Service	New Mexico Rep. Bob Wooley
U.S. Geologic Survey	New Mexico Senator Carrol Leavell
State Agencies	New Mexico Senator Gay Kernan
New Mexico State Land Office	New Mexico Senator Ron Griggs
New Mexico Department of Agriculture	New Mexico Senator Cliff Pirtle
New Mexico Department of Cultural Affairs	New Mexico Senator Stuart Ingle
New Mexico Department of Game & Fish	U.S. Rep. Steve Pearce
New Mexico Department of Transportation	U.S. Senator Martin Heinrich
New Mexico Energy, Minerals, and Natural Resources Department	U.S. Senator Tom Udall
New Mexico Environment Department	**Non-Governmental Organizations**
New Mexico Historic Preservation Division	Center for Excellence in Hazardous Materials Management
Office of the State Engineer	
Local Agencies and Governments	Chihuahuan Desert Conservation Alliance
Carlsbad Irrigation District	Central Valley Electric Coop
Carlsbad Soil and Water Conservation District	Desert Rough Riders
Chaves County	New Mexico Off Highway Vehicle Alliance
Chaves County Public Lands Advisory Committee	New Mexico Oil & Gas Association
Eddy County	New Mexico Wilderness Alliance
City of Artesia	New Mexico Wildlife Federation
City of Carlsbad	New Mexico Public Lands Council
City of Eunice	Pew Environment Group
City of Hobbs	Public Service Company of New Mexico
City of Jal	Sandia National Labs
City of Lovington	Southwest Environmental Center
Eddy County Extension Service	The Nature Conservancy
Hobbs Chamber of Commerce	University of New Mexico
Lea County	Wildearth Guardians
Lea County Water Users Association	New Mexico State University
Lea Soil and Water Conservation District	New Mexico Natural History Institute
Carlsbad Chamber of Commerce	New Mexico Lesser Prairie-Chicken / Sand Dune Lizard Working Group
Carlsbad Department of Development	
Pecos District Resource Advisory Council	

5.5 LIST OF PREPARERS

Reviewers and preparers of the Draft RMP/EIS, including members of the Interdisciplinary Team, are listed in Table 5-5.

Table 5-5. Draft RMP/EIS List of Preparers

Name	Title and/or Responsibility
Carlsbad Field Office Interdisciplinary Team	
Bruce Boeke	Archaeology and Cultural Resources
Cassandra Brooks / Kelley Reid	Wildlife Biologist
Chelsie Dugan	Hydrologist
Christopher Walls	Petroleum Engineer / Fluid Minerals
Colleen Cepero Rios	Surface Protection
Emily Metcalf / Rolando Hernandez	Geographic Information Systems
Hector Gonzalez	Planning and Environmental Specialist / RMP Team Lead
Indra Dahal / James Rutley	Geology and Mineral Resources
Katie Sandbom	Botanist / Soil / Vegetation / Noxious Weeds
Kyle Rybacki	Cave / Karst Resources
Michael Ramirez	Range / Grazing / Soil / Vegetation / Noxious Weeds
Robert Gomez	Realty
Tracy Hughes	Recreation / Visual Resources / Travel Management / Wilderness
Tye Bryson	Fire Management
Pecos District / Carlsbad Field Office Management Team	
James Stovall	District Manager
Kari Vasenden	Associate Field Manager
Ty Allen	Assistant Field Manager, Resources
Cody Layton	Assistant Field Manager, Minerals
New Mexico State Office Management and Review Team	
Aden Seidlitz	State Director (Acting)
Leslie Holland	Associate State Director (Acting)
Sheila Mallory / Michael Gibson	Deputy State Director, Minerals / Branch Chief, Minerals
Melanie Barnes / Sarah Schlanger	Deputy State Director, Resources / Branch Chief, Resources
Bradley Higdon	Planning and Environmental Coordinator (Acting)
Calvin Deal	Geographic Information Systems
Michael Johnson	Socioeconomics
Terry Heslin	Recreation / Travel / NSHT
Zoe Davidson	Botany / AIM / Rare Plants
Dave Herrell / Sharay Dixon	Soil / Water /Air Resources
Cynthia Hernan / Phil Gensler	Cultural Resources, Tribal Consultation / Paleontology
McKinney Briske	Wilderness / Visual Resources / NLCS
John Sherman	Wildlife / Riparian / Fisheries
Nathan Combs	Range and Weeds
Mark Coca	Forestry / Healthy Lands
Marikay Ramsey	Wildlife Biologist / T&E
Rebecca Hunt / Meredith Campbell	Fluid Mineral / Surface - Oil and Gas Stipulations
Adrienne Brumley	Fluid Minerals / Geology
Anthony Bates / William Auby	Solid Minerals / Locatables / Salables
Debby Lucero / Sarah Naranjo	Realty
Lisa Bye	Fire and Fuels
Consultant	
SWCA Environmental Consultants	

Chapter 6:

Literature Cited

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Chapter 6: Literature Cited

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CHAPTER 4

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CHAPTER 5

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APPENDICES

Appendix N

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