CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Roadmap to Chapter 4

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

This chapter describes environmental consequences that may result from implementing the four alternatives described in Chapter 2. The purpose of this chapter is to analyze and disclose potential significant impacts of the federal action on the human environment. The federal action for this Final Environmental Impact Statement (FEIS) is the Bureau of Land Management's (BLM's) selection of an alternative on which future land use actions would be based.

The potential consequences of each alternative are described in this chapter as impacts using the same order of eight resource topics (e.g., Physical Resources, Mineral Resources, etc.) presented in Chapter 3. Identical organization for chapters 3 and 4 allows the reader to compare existing resource conditions (Chapter 3) to potential impacts (Chapter 4) for the same resources. The analysis of environmental consequences focuses on key planning issues (see Chapter 1) raised during the scoping process rather than providing an encyclopedic discussion of all possible consequences. Each resource or resource use in this chapter is organized as described below. BLM's Land Use Planning Handbook generally defines resources as including natural, biological, and physical resources. BLM's Land Use Planning Handbook (H-1601-1) identifies resource uses to include forestry, livestock grazing, recreation and visitor services, comprehensive trails and travel management, lands and realty, coal, oil shale, fluid minerals, locatable minerals, nonenergy leasables, and mineral materials.

Introduction

The discussion of environmental consequences for each resource program begins with a brief definition of what is considered an impact for the resource. When applicable, definitions of the following types of impacts are also included.

Beneficial/Adverse Impacts. When applicable, beneficial and adverse impacts are differentiated in this chapter. For example, an alternative that increases the number of surface water reservoirs constructed within the Green River watershed is expected to have a beneficial impact on select local fish and recreation; however, if this alternative also increases water depletion (via evaporation) in the Colorado River, it may adversely impact downstream special status species, such as the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker. The presentation of both beneficial and adverse impacts for key planning issues is intended to provide the BLM decisionmaker and reader with an understanding of the multiple-use tradeoffs associated with each alternative. However, not all possible impacts are described and, unless otherwise stated, impacts described in this chapter are assumed adverse.

Direct/Indirect Impacts. In general, direct impacts result from activities authorized by the BLM and generally occur at the same time and place as the management activity or action causing the impact. For example, for the action of building a road, a direct adverse impact is surface disturbance. Surface disturbance is the impact (the effect) of heavy equipment (the cause) removing existing vegetation as it grades the proposed road location. Indirect impacts often occur at some distance or time from the action. In the above example, an indirect impact could occur days after the surface is disturbed and some distance from the disturbance. Heavy precipitation following the removal of vegetation and disturbance of the ground surface could erode soil and transport sediment into streams. The impact on stream-water quality is considered an indirect adverse impact.

Short- or Long-Term Impacts. Where applicable, the short-term or long-term aspects of impacts are described in this chapter. For purposes of this EIS, short-term impacts occur during or after the activity or

action and may continue for up to five years. Long-term impacts occur beyond the first five years. Five years is an approximation of the time required to reclaim an area following surface disturbance.

Methods and Assumptions

Due to the programmatic and strategic nature of the Resource Management Plan (RMP) alternatives, the timing and specific location of project-specific actions that could impact resource values are not defined. In addition, the RMP cannot anticipate or analyze all possible future impacts. Moreover, the relationship between cause (future actions) and effect (impact on resources) is not always known or quantifiable. For these reasons, the analysis of alternatives is both qualitative and quantitative and based on a series of assumptions. Quantitative analysis refers to the use of numbers for assessing impacts; whereas qualitative analysis is performed where numbers are lacking and relies on general information or professional judgment. The methods and assumptions listed below, and for each resource in the following sections, are disclosed to provide a basis for the conclusions reached in this chapter. Assumptions common to all alternatives and all resources are listed below, whereas assumptions unique to specific resources and resource uses are listed under Methods and Assumptions in the appropriate resource section.

- All alternatives are implemented in compliance with standard practices, best management practices (BMPs), guidelines for surface-disturbing activities, and mitigation guidelines. In other words, these practices and guidelines are considered a component of each alternative.
- An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (BLM Form 3100-11, Lease for Oil and Gas). Because the Secretary of the Interior has the authority and responsibility to protect the environment on lands leased for oil and gas, stipulations may be required as conditions of lease issuance. Stipulations become part of the lease and will supersede inconsistent provisions in the standard lease form.
- The United States Court of Appeals for the D.C. Circuit in Sierra Club v. Peterson, 717 F.2d. 1409 (D.C. Cir. 1983) found that "on land leased without an NSO stipulation, the DOI [U.S. Department of the Interior] cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building."
- Provisions in leases that expressly provide Secretarial authority to deny or restrict development in whole or in part depend on an opinion provided by the U.S. Fish and Wildlife Service (USFWS) regarding impacts to endangered or threatened species or habitats of plants and animals that are listed or proposed for listing. If the USFWS concludes that the development likely would jeopardize the continued existence of any endangered or threatened plant or animal species, then the development may be denied in whole or in part.
- Although not specifically defined as a surface-disturbing activity, concentrated livestock and native ungulate grazing, off-highway vehicle (OHV) use, and fire may remove vegetation and expose the soil surface leading to increased erosion and the opportunity for establishing invasive nonnative species (INNS).
- Comparison of impacts among resources is intended to provide an impartial assessment to inform the decisionmaker and the public. The impact analysis does not imply or assign a value or numerical ranking to impacts. Actions resulting in adverse impacts to one resource may impart a beneficial impact to other resources.

- Key planning issues identified in Chapter 1 provide the focus for the scope of impact analyses in this chapter.
- In general, adverse impacts described in this chapter are considered significant if they result from or relate to the key planning issues described in Chapter 1 and the context or intensity of impacts suggest potential impacts to public health and safety; potential for violating legal standards, laws, or protective status of resources; or potential impacts to unique resources.
- The comparison of individual alternatives is qualitative or quantitative, relative to Alternative A (current management), and based on professional judgment and consideration of the context and intensity of allowable uses and management actions anticipated to impact resources and resource uses.
- Analysis of environmental consequences considered the extent of projected surface disturbance and associated development from BLM actions.
- Analysis assumes the limited anticipated quantity of produced water in the Kemmerer Field Office planning area (planning area) and water-quality regulation by the Wyoming Department of Environmental Quality (DEQ) will avoid significant adverse impacts to water quality in the planning area from well-produced water under any alternative.
- The analysis of impacts reflects the anticipated consequences of alternatives on individual resources; for example, the impact of alternatives on INNS. The anticipated impacts of individual resources on other resources are discussed in the appropriate sections. For example, the impact of INNS on wildlife is described in the wildlife section—not in the INNS section.
- The analysis of impacts focuses on the anticipated incremental and meaningful impact of management actions and allowable uses proposed for each alternative. The impact of past and present actions is encompassed within the description of existing conditions in Chapter 3, Affected Environment.
- The definition of surface-disturbing activities used for analysis is provided in the Glossary (Volume 2). Surface disturbance typically is described in terms of the total acres of short- or long-term disturbance from BLM actions, as shown in Table 4-1. Refer to Appendix M for projected surface disturbance associated within individual reasonable foreseeable actions (RFAs). Surface disturbance for new wells that are later abandoned is reclaimed and accounted for in surface disturbance acreage in Appendix M. For analysis purposes, the acreage of surface disturbance for new well pads and associated facilities varies with the fields and formations developed, and assumes that there will be one well pad per producing well. See Appendix N for the Wyoming BLM mitigation guidelines for surface-disturbing and disruptive activities.

Table 4-1. Total Projected Surface Disturbance from BLM Reasonable Foreseeable Actions in the Kemmerer Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D *(Proposed RMP)*
Total Acres Short-Term Disturbance from BLM Actions	214,120	104,338	174,967	147,262
Total Acres Reclaimed from BLM Actions	69,447	57,106	30,500	69,721
Total Acres Long-Term Disturbance from BLM Actions	144,673	47,232	144,467	77,541

Source: Appendix M, Table M-1
BLM Bureau of Land Management

- Under all alternatives, appropriate threatened and endangered species surveys will be conducted, where applicable, during the appropriate season.
- No surface occupancy (NSO) restrictions proposed in this RMP can be applied to new oil and gas leases only. Stipulations on existing leases will continue as they are. New constraints and requirements identified in the approved plan may be applied to subsequent exploration and development activities on existing leases through the use of Conditions of Approval, provided they are within the authority reserved by the terms and conditions of the lease.
- New rights-of-way (ROW) and all other BLM authorizations will comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA).
- Sylvatic plague can have disastrous impacts on prairie dog populations. While sylvatic plague can be reduced by population management, no action can entirely remove the threat of plague.
- BLM, in cooperation with state and other federal wildlife agencies, is responsible for managing habitats (e.g., quality, suitability, usability), whereas state and federal wildlife management agencies (e.g., the Wyoming Game and Fish Department [WGFD], USFWS) have primary authority for overseeing management of wildlife populations.
- Surface disturbances generally increase the potential for accelerated sediment loading to streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surface, changes in water routing, and loss of vegetation.
- It is assumed that the greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment will enter the stream, contribute to the loss of riparian functionality, and increase the potential for violation of state water quality standards. Reclamation efforts would be successful in reducing runoff to natural levels soon after they are completed and will be monitored and maintained to create conditions that allow natural succession.
- Surface disturbances associated with pipelines would be allowed to proceed to a state of succession that stabilizes the surface and produces natural levels of runoff, but may be maintained at a lower stage of vegetative succession than that of surrounding undisturbed land for purposes of safety and maintenance.
- Livestock and wildlife use are typically disproportionately higher in riparian communities than in upland communities. Improper grazing can adversely impact these communities throughout the year, but generally, greater impacts occur in the spring and early summer, when soils are wet and more vulnerable to compaction and when stream banks are more vulnerable to sloughing. Livestock, especially cattle, tend to congregate in these communities during the hot season (mid to late summer). While stocking rates for an allotment or pasture may be low to moderate, the utilization levels in riparian areas can be high if grazing is not properly managed.
- The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) set forth standards that apply to all activities. Applying the Guidelines is generally effective in managing the impacts to vegetation health, as well as soils, by minimizing erosion impacts that may be caused by domestic livestock grazing. Adjustments to grazing authorizations are made on a case-by-case basis when site-specific studies indicate changes in management are required.
- Drilling in the Overthrust Belt is primarily directional (especially in the Bear River Divide) and is assumed to take longer than drilling the wells on the eastern side of the planning area in and near the Moxa (mainly Frontier and Dakota formations).

Analysis of Alternatives

The analysis of alternatives describes how each alternative could affect baseline conditions of individual resources in the planning area. Impacts typically are described by topic such as surface disturbance, other resources or resource uses, and proactive management actions. Proactive management actions generally include management actions anticipated to protect or enhance the resource of interest. For example, proactive management actions for soils include prohibiting or restricting surface-disturbing activities on steep slopes or highly erosive soils. If a particular allowable use or management action is not discussed for a resource, it is because no impacts are expected or the anticipated impact is not considered significant.

Conclusion

The conclusion section for each resource and resource use briefly highlights the overall impacts of alternatives relative to which alternatives are projected to have the most and least impacts. Action Alternatives are compared to the No Action Alternative (Alternative A). In some cases, there are no discernable differences in impacts from alternatives.

Cumulative Impacts

Cumulative impacts are described in the Cumulative Impacts section of this chapter. Cumulative impacts combine the past and present impacts encompassed in existing conditions described in Chapter 3 with the anticipated incremental impacts of alternatives described in the sections of this chapter and the impacts of reasonably foreseeable future actions. The Cumulative Impacts section also includes anticipated incremental impacts of non-BLM RFAs.

4.1 Physical Resources

4.1.1 Air Quality

Actions that could occur through implementing each alternative could affect future air quality levels within the project study area. This section describes the impacts of each alternative on air quality in terms of short-term and long-term impacts.

4.1.1.1 Methods and Assumptions

The air quality analysis estimated emissions associated with proposed management actions for each project alternative. The analysis focused on emissions associated with operational emissions approximately 10 and 20 years in the future (years 2011 and 2020). As a reasonably conservative approach, the analysis included the peak annual construction emissions to years 2011 and 2020 operational emissions to estimate total annual emissions for these years. Years 2011 and 2020 emissions were compared to year 2001 existing emissions to determine the future change in emissions levels for each project alternative. Refer to Appendix J for the Technical Support Document for Air Quality.

Activity data used to estimate emissions for proposed emissions sources were obtained from Kemmerer Field Office staff and National Environmental Policy Act (42 United States Code [USC] § 4321 et seq.) (NEPA) analyses performed for BLM actions within Wyoming that are similar to those associated with the actions proposed in this EIS (BLM 2002g; BLM 2006b; BLM 2008a). Emissions factors used to estimate proposed emissions were obtained from (1) the U.S. Environmental Protection Agency (EPA) NONROAD Emissions Model (EPA 2004); (2) Wyoming DEQ best available control technology (BACT) levels for natural gas-fired internal combustion engines (Hanify 2006; Wyoming DEQ 2000); (3) MOBILE6 emissions models for on-road vehicles (EPA 2003); and (4) special studies on fugitive dust emissions. The Technical Support Document for Air Quality (Appendix J) includes data and assumptions used to estimate emissions for each project alternative.

Methods and assumptions used in this impact analysis include the following:

- Stationary sources associated with oil and gas development operate at emissions levels based on currently observed BACT levels.
- Activity data associated with management actions other than those related to oil and gas and coalbed natural gas (CBNG) wells were averaged over the entire analysis period to produce annual average emissions.
- EPA off-road emissions standards were used to estimate emissions for nonroad sources in project years 2006/2011/2020. This approach simulated the replacement of existing sources by new lower-emitting equipment with future EPA off-road emissions standards.
- The analysis in this section estimated emissions only from activities that would occur on federal lands within the planning area.
- Use of water application as a BMP reduces fugitive dust emissions from surface-disturbing activities during construction, reclamation, and maintenance of roads by 50 percent from uncontrolled levels.

The analysis calculated emissions for the following 13 types of development and use activities: (1) oil development, (2) CBNG and conventional natural gas development, (3) coal mine development, (4) salable and locatable minerals development, (5) renewable energy development, (6) livestock management activities, (7) vegetation management, (8) fire management (including prescribed fire), (9)

forest and woodlands activities, (10) ROW, (11) OHV use, (12) resource roads, (13) trona mining and processing; and (14) geophysical exploration. Activities related to cultural resources, paleontology, recreation, noxious and invasive weed control, and wildlife and fish would produce inconsequential amounts of air emissions.

The project study area for air quality includes the planning area and federal Class I areas within 100 miles. The nearest federal Class I areas to the planning area are the Grand Teton National Park (approximately 30 miles to the north), the Bridger Wilderness Area (approximately 40 miles to the east), and the Teton Wilderness Area (approximately 50 miles to the north). Table 4-2 summarizes the annual emissions under each alternative.

Table 4-2. Total Annual Emissions Summary for BLM Activities within the Kemmerer Planning Area

	Emissions (tons per year)						
Summary Year	**PM_{10}**	**$PM_{2.5}$**	**NO_x**	**SO_x**	**CO**	**VOC**	**HAP**
Base Year (2001) Totals	2,832	2,241	7,965	5,132	6,585	13,670	1,128
Alternative A							
2011 Total	4,215	2,471	8,218	5,141	7,425	12,932	1,057
2020 Total	3,058	2,310	8,128	5,142	7,982	13,186	1,088
Alternative B							
2011 Total	4,117	2,429	7,776	5,089	7,084	11,389	901
2020 Total	2,932	2,249	7,491	5,089	7,411	11,011	866
Alternative C							
2011 Total	4,148	2,461	8,219	5,141	7,425	12,947	1,059
2020 Total	4,183	2,478	8,131	5,143	7,984	13,209	1,090
Alternative D (Proposed RMP)							
2011 Total	4,215	2,471	8,210	5,141	7,419	12,909	1,055
2020 Total	3,654	2,399	8,123	5,142	7,975	13,171	1,086

Source: Appendix J
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
SO_x sulfur oxides
VOC volatile organic compound

4.1.1.2 Analysis of Alternatives

Allowable uses and management actions that could impact air quality include management actions that reduce emissions or may result in increased emissions. The impacts projected to occur to air quality as a result of the various alternatives are similar; however, the intensity of the impacts is anticipated to vary by alternative.

Global Climate Change

The assessment of greenhouse gas (GHG) emissions and climate change is still in its formative phase; therefore, it is not yet possible to know with confidence the net impact to climate. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recently concluded that "warming of the climate system is unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations."

The lack of scientific tools designed to predict climate change at regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to air quality due to climate change are

likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased wind blown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. Due to loss of habitat, or due to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Less snow at lower elevations would be likely to affect the timing and quantity of snowmelt, which, in turn, could result in a longer wildfire season.

Several BLM authorized activities, including oil and gas development, salable minerals mining and processing, locatable mineral mining and processing, large wildfires, and use of combustion engines for recreation and transportation, will contribute emissions of GHGs to the atmosphere. However, there is limited ability to provide an analysis on how these emissions may impact climate change and existing resources because the lack of appropriate scientific tools currently limits the ability to analyze how quantities of activity emissions may contribute to a change in average annual global surface temperature rise. While BLM authorized activities may contribute emissions of GHGs, it is unknown if these contributions would be significant because there are no known federal or state levels of significance. This discussion is ongoing and has yet to reach a conclusion. However, climate change science is rapidly advancing, and prediction models are currently being developed by academia and research organizations; therefore while this type of analysis may be possible in the future, it is not possible at this time. Given these analysis limitations, accounting, disclosure, and potential mitigation measures of GHG emissions are the most appropriate options when activity level information becomes available.

Impacts Common to All Alternatives

Proposed management actions associated with each project alternative will decrease or increase impacts to air quality, depending on whether they eliminate existing emissions sources or increase emissions from current levels. Air quality impacts from these actions primarily result from minerals development and production, as potential emissions associated with these actions substantially outweigh those produced from any other proposed activity. BLM would require that potential impacts from any proposed project under this RMP are consistent with federal land management guidance, in consultation with state and other federal agencies.

Short-term air quality impacts from minerals development and production occur from six sources: (1) combustion emissions (vehicle tailpipe and exhaust stack emissions) due to the operation of mobile and stationary source construction equipment, (2) fugitive dust emissions (particulate matter less than 10 microns in diameter [PM_{10}]) due to earthmoving activities and the operation of vehicles on unpaved surfaces, (3) nitrogen oxides (NO_x) emissions from blasting, (4) particulate emissions from blasting, (5) coal fines blowing off trains hauling coal out of the planning area, and (6) diesel emissions from those same trains. Minerals production generates long-term combustive and fugitive dust emissions from two sources: (1) stationary sources, such as natural gas flaring, natural gas-fired compressors, and minerals storage, processing, and handling equipment; and (2) mobile sources that access and service oil and gas facilities and extract and handle subsurface minerals, such as coal and hard minerals. An example of minerals production that, even though it primarily occurs on private land, emits plumes visible on BLM-managed lands is trona processing, which is concentrated in a fairly small segment of the planning area. These plumes are most evident during winter air inversions. Minerals reclamation activities also produce combustive and fugitive dust.

There is a potential of ozone formation from operational activities. Ozone is a secondary pollutant formed from emissions of volatile organic compounds (VOCs) and NO_x, in the presence of sunlight. The potential for ozone formation in BLM planning areas of southwest Wyoming has been addressed in detailed modeling exercises, such as the Pinedale Anticline Supplemental EIS – BLM modeling and monitoring ozone supplement (revised), released in June 2008.The project alternatives could impact air quality-related values (AQRV)s within federal Class I areas listed in Chapter 3. Although minerals

development and production are the primary sources of emissions, other resource management actions that could produce combustive and (or) fugitive dust emissions include the following:

1. Forestry production due to road construction, logging equipment usage, slash burning, and prescribed burns.
2. Fire management due to the combustion of vegetation from prescribed fire and wildland fire, combustive emissions from the use of fire suppression equipment, and fugitive dust from the use of fire suppression equipment on unpaved roads; emissions from prescribed and wildland fires depend on fuel and meteorological conditions.
3. Road maintenance due to the use of grading equipment on unpaved roads.
4. ROWs due to combustive and fugitive dust emissions from equipment used to construct proposed infrastructure.
5. OHV use due to combustive and fugitive dust emissions.

The Wyoming DEQ has the authority to implement emissions controls for sources requiring air permits under the Wyoming Air Quality Standards and Regulations and to ensure that these sources do not contribute to an exceedance of an ambient air quality standard. The planning area activities that impact air quality have not changed appreciably since 2001. Approximately the same number of oil and gas drilling rigs are operating in the planning area. In addition, the BLM requires implementing BMPs within its authority to minimize impacts, such as fugitive dust emissions, in proximity to high use roadways, populated areas, and resource-sensitive areas.

Alternative A

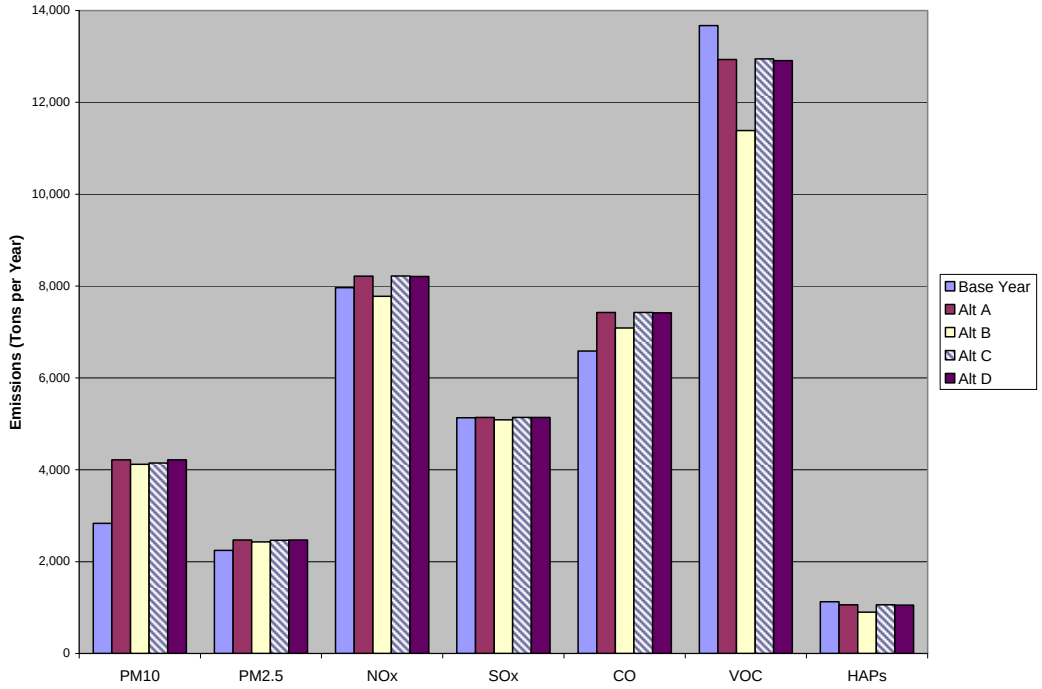
Figure 4-1 presents a summary of annual emissions for the base year (2001) and for 2011 for each alternative. Figure 4-2 presents a summary of annual emissions for the base year and for 2020 for each alternative. The detailed spreadsheets serving as the basis of these charts, along with the emissions calculations and summary tables, are provided in Appendix J.

Figure 4-2 also shows that Alternative A results in increased emissions levels for five of the seven pollutants by 2020, compared to existing conditions in year 2001. The increases are projected to be carbon monoxide (CO), NO_x, sulfur oxides (SO_x), $PM_{2.5}$, and PM_{10} emissions, increasing by 1,397 tons (21%), 163 tons (2%), 10 tons (0.2%), 69 tons (3%), and 227 tons (8%), respectively, from 2001 levels. VOC and hazardous air pollutant (HAP) emissions are projected to decline. The largest source of these increased emissions is the new development of oil and natural gas production in the planning area.

The planning area is a large irregularly shaped area with a maximum east-west extent of 75 miles and a north-south extent of 140 miles. Given the generally good air quality existing in the project region and the expected separation of sources within the planning area, it is unlikely emissions from Alternative A would contribute to an exceedance of a national or state ambient air quality standard. Depending on the locations and emissions levels of proposed sources in the area, the surrounding topographical characteristics, and the site-specific meteorology, localized air quality impacts could occur.

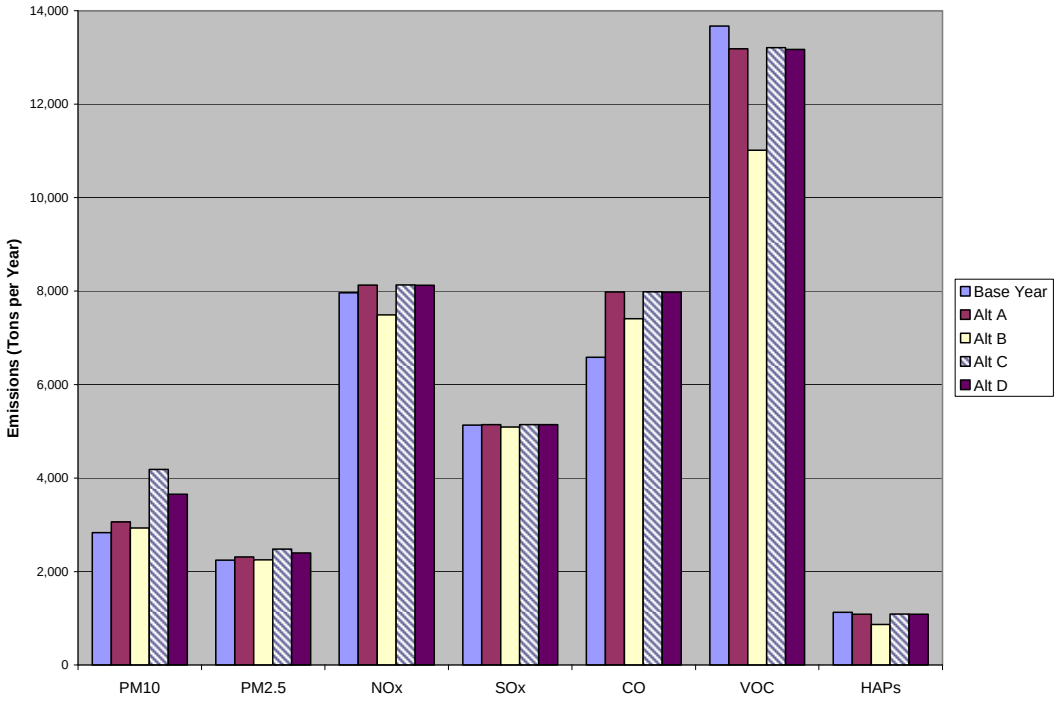
The impacts of these future air emissions at pristine Class I areas under Alternative A are difficult to estimate with any level of confidence without information on the specific locations and characteristics of projected sources in the planning area. Detailed air dispersion modeling can be used to estimate these impacts, but the modeling is sensitive to atmospheric conditions and to the exact locations and the emissions levels of the proposed sources in the planning area. In addition, the Wyoming DEQ air-permitting processes require larger development projects to identify the locations for specific emissions sources to demonstrate with dispersion modeling analyses that proposed emissions would not adversely impact AQRVs in Class I areas.

Figure 4-1. Projected Emissions from Activities on BLM-Administered Land and Mineral Estate in the Kemmerer Planning Area: Year 2011



Source: Calculated from multiple sources, as described in this chapter and Appendix J

Figure 4-2. Projected Emissions from Activities on BLM-Administered Land and Mineral Estate in the Kemmerer Planning Area: Year 2020



Source: Calculated from multiple sources, as described in this chapter and Appendix J

In addition to the proposed sources of HAPs within the planning area, there could be emissions of hydrogen sulfide (H_2S). These sources include fossil fuel combustion, fugitive VOCs, and emissions due to oil and gas production. The accidental release of sour natural gas (rich in H_2S) poses the main risk under Alternative A. Another source of release of H_2S is at oil and gas fields where secondary recovery operations are occurring. To mitigate H_2S impacts, applications for permit to drill in sour gas areas include a contingency plan possibly including requirements to monitor wind speed, wind direction, and atmospheric stability; conduct dispersion modeling analyses; and develop a notification plan. These requirements would apply to areas where public health and safety or important resource values are a concern, such as proposed well sites in proximity to residences. If the BLM determines after review of a contingency plan that additional data or safety precautions are needed, the BLM will require these items as conditions of approval (COA). The potential release of H_2S during production operations in sour gas areas may be mitigated by health and safety plans.

The BLM is considering implementing mitigation actions within its authority to reduce emissions under Alternative A, such as selecting projects with smaller area coverage, fewer units, or less ground disturbance, or choosing projects with improved designs that minimize air emissions. The BLM will use dispersion modeling to estimate the impacts of projects whose emissions have not been analyzed before, but might be substantive. If an analysis shows that substantial impacts are possible, mitigation measures similar to those presented in Appendix L may be recommended. The BLM also will facilitate discussions with stakeholders to recommend mitigation beyond the BLM's authority to reduce proposed emissions, including considering a program to offset emissions from proposed projects, and reducing emissions from existing sources by techniques such as retrofits with more stringent control requirements.

Alternative B

Figure 4-1 and Figure 4-2 present an estimate of base year and future annual emissions for each alternative in years 2011 and 2020, respectively. Figure 4-2 shows that compared to the 2001 base year emissions, in 2020, Alternative B results in the lowest emissions of any of the alternatives. The largest increase in terms of percent of 2001 emissions is for CO (an increase of 826 tons, or 13%); PM_{10} would also increase slightly (100 tons or 4%), as would $PM_{2.5}$ (8 tons, about 0.3%), but all other pollutants would decrease from 2001 levels.

As a result, under this alternative, impacts on AQRVs at the nearest Class I areas would be similar to base year conditions. In addition, given the generally good air quality existing in the project region, emissions from Alternative B have the lowest potential to contribute to an exceedance of National Ambient Air Quality Standards (NAAQS) or Wyoming Ambient Air Quality Standards (WAAQS). Implementing the mitigations identified for Alternative A also reduces emissions and air quality impacts associated with Alternative B.

Alternative C

Figure 4-2 shows that Alternative C results in moderately increased emissions levels for all pollutants by 2020, compared to existing conditions in year 2001. In terms of percentage gain, the most substantive increases are projected to be PM_{10}, CO, and $PM_{2.5}$ emissions, with increases of 1,351 tons (48%), 1,400 tons (21%), and 237 tons (11%), respectively, from 2001 levels. Emissions of NO_x would increase by 2.1% compared to existing conditions, and emissions of sulfur dioxide (SO_2) would increase by about 0.2%. As shown in Figure 4-2, the emissions increases under Alternative C over base year conditions were essentially the same as those in Alternative A, except for PM_{10} and $PM_{2.5}$ emissions, which were higher than in Alternative A. The primary source of these increased emissions from base year conditions is the new development of renewable energy and oil and natural gas production in the planning area.

The air quality impacts under Alternative C are similar to the impacts under Alternative A, but with more PM_{10} and $PM_{2.5}$ impacts. Nevertheless, it is likely that emissions under Alternative C have a low potential to contribute to an exceedance of an NAAQS or WAAQS due to the generally good air quality existing in the project region. In addition, since emissions increases will be spread over relatively large distances, this alternative is not expected to cause adverse impacts to AQRVs in the nearby wilderness areas. Implementing the mitigations identified for Alternative A also will reduce emissions and air quality impacts associated with Alternative C.

Alternative D (Proposed RMP)

Figure 4-2 shows that Alternative D will result in moderately increased emissions levels for all pollutants by 2020, compared to existing conditions in year 2001. In terms of percentage increase, the most substantial increases were projected to be $PM_{10,}$ CO, and $PM_{2.5}$ emissions, with an increase of 823 tons (29%), 1,390 tons (21%), and 158 tons (7%), respectively, from 2001 levels. Emissions of NO_x would increase by 2% compared to existing conditions, and emissions of SO_2 would increase by about 0.2%.

The air quality impacts under Alternative D are similar to the impacts under Alternative A, but with more PM_{10} and $PM_{2.5}$ impacts. Nevertheless, it is likely that emissions under Alternative D have a low potential to contribute to an exceedance of an NAAQS or WAAQS due to the generally good air quality existing in the project region. In addition, since emissions increases will be spread over relatively large distances, this alternative is not expected to cause adverse impacts to AQRVs in the nearby wilderness areas. Implementing the mitigations identified for Alternative A also will reduce emissions and air quality impacts associated with Alternative D.

4.1.1.3 Conclusion

Alternative B results in the least amount of development and the most land use restrictions; therefore, it is the alternative with the lowest levels of air emissions in 2011 and 2020. Compared to base year emissions, Alternative B could result in relatively small increases in some pollutants, such as PM_{10} and CO, a substantial decrease in NO_x, VOC, and HAP emissions, and a small decrease in SO_2 emissions compared to 2001. Alternative B is expected to have the lowest potential for exceedances of ambient air quality standards or cause adverse impacts on AQRVs in Class I areas.

Alternatives A, C, and D could result in increases of PM_{10}, $PM_{2.5}$, and CO, as well as NO_x (although the estimated percentage increase is never more than 2.1 percent) and SO_2 (although the estimated percent increase is at most 0.2% for any alternative). These alternatives also have lower emissions of VOCs and HAPs compared to 2001 conditions. The emissions levels among these alternatives are very similar, except for PM_{10}, which is somewhat higher for Alternative C due to increased development of renewable energy. Because new or expanded individual development projects are likely to be widely separated throughout the planning area and current measured air quality concentrations are well below federal and Wyoming standards, it is unlikely that the increased emissions will contribute to an exceedance of a national or state ambient air quality standard.

4.1.2 Soil

Stable and productive soil in the planning area provides the foundation for other resources (e.g., biological resources) and for resource uses (e.g., livestock grazing). Actions that disturb or compact soil, disrupt soil stability, or reduce soil productivity are considered adverse impacts. Conversely, beneficial impacts to soil include actions that stabilize soil or increase soil productivity. Those actions that avoid or minimize soil compaction or erosion, stabilize soil, or increase soil productivity are beneficial.

Most allowable uses could affect soil resources to some degree. Appendix M identifies projected surface disturbance acreage resulting from all RFAs. The BLM actions most likely to cause the greatest amount

of short-term disturbance are mineral development, wildland fire suppression, road and trail development, and the reclamation of disturbed areas. Developing coal resources will produce the greatest amount of long-term disturbance resulting from a BLM-approved action. Surface-disturbing actions will result in removal of vegetative cover, soil compaction, reduced infiltration, changes in physical and biological properties, reduction in organic matter content, reduced productivity, and increased erosion rates. These direct impacts to soils tend to result primarily from removing the vegetative cover, loosening the surface soil, the formation of compacted layers, and increasing the potential for accelerated erosion by exposing soil particles to wind and water. Construction of roads, well pads, and other facilities results in a loss of soil productivity through disruption of natural soil horizons and removal of vegetation.

Indirect impacts caused by disrupting soil stability, increased compaction, and reduced productivity include (1) sedimentation of drainages and perennial water bodies primarily by wind or water erosion, (2) particulate matter affecting air quality through wind erosion, (3) reduced infiltration, (4) an increase in surface water runoff that could cause higher peak streamflows and possibly downstream flooding, (5) changes in surface water quality caused by exposing soils with undesirable chemical characteristics, and (6) loss of wetland soil characteristics and vegetation through accelerated soil drainage and reduced infiltration. These indirect impacts are minimized through implementing BMPs and developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) containing erosion and sediment control plans, as required under the Wyoming Pollutant Discharge Elimination System (WYPDES) Storm Water Program. BLM requires erosion, restoration, and revegetation plans, as well as compliance with Wyoming DEQ requirements for storm water permits for surface disturbances of one or more acres and for many industrial activities.

Surface uses that may not result in direct surface disturbance, but may affect soil stability through changes in vegetative cover or soil infiltration rates, include grazing by livestock and wildlife (if grazing damages vegetative cover beyond its ability to recover in a timely manner), vegetative treatments, and OHV use (especially cross-country travel). Operating motorized vehicles on moist soils, especially heavy equipment, is likely to cause compaction of the surface layer, which may increase runoff, decrease infiltration and aeration, and reduce soil productivity by making it more difficult for plant roots to establish or obtain soil moisture and nutrients.

Short-term impacts to soils may result from initial surface disturbance prior to reestablishing vegetation or installing other practices that minimize wind and water erosion. The amount of bare ground predicted under each alternative after successful reclamation of disturbed areas is important to consider when evaluating long-term impacts to soils. Areas not reclaimed, leaving bare ground, include roads and areas around facilities that sustain concentrated surface uses by equipment or are necessary to prevent the potential for fire from the equipment. Other long-term impacts to soils include the loss of productivity in areas where facilities and structures are built due to soil removal or alteration of the soil profile. For the purpose of this analysis, long-term impacts due to accelerated erosion occur in locations where bare soils are allowed to remain exposed to wind and water for more than 5 years. Other long-term impacts to soils include the loss of productivity due to soil removal or alteration of the soil profile. Refer to Maps 4 through 6 for soils.

4.1.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Due to the lack of detailed soil surveys for the planning area, impacts to soils are described in qualitative terms based on general characteristics of the five geomorphic soil groups as outlined in Chapter 3. A soil survey for portions of the planning area currently is under way and may be used for future planning under all alternatives.

- The majority of the soils susceptible to wind and water erosion are located within the Green River Basin Uplands. Soils along the upland ridges in the Overthrust Belt soil group are highly susceptible to water erosion.
- Bare soil (without vegetation or other surface cover) with a surface layer that has been altered from its natural condition is more susceptible to accelerated wind and water erosion than undisturbed soil.
- Erosion from well pads is minimal once vegetation is reestablished. Successful establishment of vegetation generally takes a minimum of 3 years, depending on soil and precipitation, and requires monitoring during this time.
- The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) provide minimum standards for vegetation health, vigor, soil cover, and erosion rates that apply to all BLM administered activities in the Standards portion of the document. The Guidelines portion of the document focuses on grazing activities.
- Projected surface disturbance for each alternative potentially modifies soils by disrupting soil stability, changing vegetative cover that can reduce nutrient recycling, damaging biological crusts, decreasing productivity, and increasing compaction. When these modifications occur on highly erodible soils, the potential for accelerated erosion is greater than on less erodible soils (USFS 2004). Site-specific erosion predictions and calculations require detailed soil mapping of areas to be disturbed. Soil mapping during site-specific analysis enables the BLM to minimize disturbance of highly erodible or otherwise sensitive soils.
- Sensitive soils incur greater adverse impacts from surface-disturbing activities than nonsensitive soils. Sensitive soils are fragile and especially susceptible to adverse impacts from surface disturbance because they are highly erodible and saline, sodic, or alkaline, or have a low reclamation potential.
- Most soils with high water erosion potential within the planning area occur on steep slopes (greater than 15%).
- Installing and maintaining erosion controls and other mitigation measures, such as BMPs, result in a substantial reduction in soil erosion, depending on site conditions (Appendix O). However, these measures may not reduce adverse soil compaction and productivity impacts.
- The risk of BMP failure is greater on highly erodible soils. To be effective on highly erodible soils, more extensive BMPs and more aggressive maintenance techniques than those commonly used are often required.

4.1.2.2 Analysis of Alternatives

The types of impacts projected to occur to soils because of the various alternatives are similar under all alternatives; however, the intensity of the impacts is anticipated to vary by specific allowable uses and management actions associated with individual alternatives, as described below. The following sections describe the anticipated impacts to soils from individual alternatives by categories anticipated to have a measurable difference among alternatives: surface-disturbing activities, OHV use, fire and fuels management, and proactive management actions.

Impacts Common to All Alternatives

Soils on BLM-administered lands could be disturbed under each alternative by activities proposed across a variety of resource programs. Appendix M lists projected surface disturbance for activities anticipated

under each alternative over the life of this plan. Refer to Table 4-1 for acres of long-term and short-term surface disturbance that may affect soils under each alternative.

To gain an understanding of the amount of surface-disturbing activities projected to occur within each soil group, Table 4-3 summarizes the percentage of each soil group subjected to oil and gas leasing constraints and serves as an indicator of the impacts to soils that could occur under each alternative. The table is intended to be used to compare the level of soil protection from surface disturbance across the alternatives within each soil group. An area that is administratively unavailable for leasing indicates the highest level of restrictions on oil and gas development under new leases. Major constraints on leases include limitations that would exclude or minimize surface disturbance and bare ground during development of oil or gas wells. A soil group with a high percentage of major constraints can be expected to result in less surface disturbance than groups with less restrictive leases. Areas with moderate constraints have fewer restrictions on surface disturbance and would therefore be likely to allow more surface-disturbing activities and bare ground in areas with high potential to be developed for producing oil and gas. Table 4-3 only lists those areas with greater limitations or constraints than are attached to leases with standard stipulations. The percentages within each geomorphic soil group under each alternative do not total 100 percent because the remainder is the acreage to be leased under standard terms and conditions with few constraints.

An example of the application of Table 4-3 is to consider the Green River Basin Uplands soil group, which is the largest in the planning area with soils that are relatively susceptible to erosion, so a relatively high percentage of major constraints on leasing (as under Alternative B) is likely to prevent or minimize impacts to erodible soils. Alternatives with more acreage of major constraints and administratively unavailable lands within the Green River Basin Uplands soil group are more likely to protect soils from erosion compared to alternatives with less acreage of those constraints. Table 4-4 identifies the percentage of the impacts subjected to oil and gas leasing constraints on federal mineral estate in the planning area.

Table 4-3. Constraints on Oil and Gas Leasing and Development on Federal Mineral Estate by Soil Group

Geomorphic Soil Group	Constraint	Alternative			
		A	B	C	D *(Proposed RMP)*
Overthrust Belt	Administratively Unavailable for Leasing	5%	71%	5%	16%
	Major	25%	26%	24%	31%
	Moderate	53%	3%	55%	52%
	Standard	17%	0%	16%	2%
Green River Basin Uplands	Administratively Unavailable for Leasing	9%	41%	9%	9%
	Major	23%	48%	22%	38%
	Moderate	52%	11%	52%	47%
	Standard	16%	1%	17%	5%
Mountainous Areas	Administratively Unavailable for Leasing	0%	3%	0%	0%
	Major	5%	85%	5%	5%
	Moderate	71%	15%	71%	82%
	Standard	24%	0%	24%	11%
Relict Alluvial Fans and High Outwash Terraces	Administratively Unavailable for Leasing	0%	0%	0%	0%
	Major	12%	88%	11%	11%
	Moderate	71%	12%	73%	83%
	Standard	17%	0%	17%	5%
Floodplains	Administratively Unavailable for Leasing	11%	48%	11%	18%
	Major	41%	59%	35%	35%
	Moderate	47%	2%	52%	46%
	Standard	2%	9%	2%	1%

Table 4-4. Summary of Constraints that Limit Oil and Gas Development

Constraints on Mineral Leasing (% of Federal Mineral Estate)	Alternative A	Alternative B	Alternative C	Alternative D *(Proposed RMP)*
Administratively Unavailable	7%	51%	7%	12%
Major Constraints	22%	41%	21%	34%

Alternative A

Surface-disturbing Activities. Surface-disturbing activities on public land under Alternative A are evaluated on a case-by-case basis. Authorizations prescribe mitigation that reduces impacts to soils from surface-disturbing actions.

Under Alternative A, the projected short-term disturbance from all BLM actions will affect 214,120 acres. Following reclamation of disturbed sites, an estimated 144,673 acres are anticipated to be affected in the long term from BLM actions under Alternative A (see Appendix M). An estimated 29 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Floodplains and Green River Basin Uplands soil group, where the majority of highly erodible soils and the greatest potential for oil and gas development occur. The lack of specific soil protection management actions under this alternative may result in accelerated erosion in some areas.

Standard BMPs and mitigation guidelines, combined with development restrictions on slopes greater than 25 percent, is the existing management and has resulted in the present conditions.

Surface-Use Activities. The majority of the planning area is designated as limited to existing roads and trails for OHV use; however, inappropriate use of these vehicles can cause undue environmental degradation and accelerate soil erosion. Accelerated erosion resulting from OHV use is not quantified, but generally is limited to isolated incidences within the planning area.

Prescribed fire is used in accordance with treatments identified by range, wildlife, and forestry programs. Mitigation measures incorporated into the fire prescription generally are effective at controlling accelerated soil erosion. Limitations on soil disturbance during fire suppression minimize adverse impacts to soils.

Proactive Management Actions. Existing management actions intended to protect soils include modifying surface-disturbing activities, implementing timing restrictions, and prohibiting surface disturbance in selected areas to reduce erosion based on site-specific evaluations. These management actions to protect soil are evaluated on a case-by-case basis.

Alternative B

Surface-disturbing Activities. Under this alternative, projected short-term disturbance from all BLM actions will affect 104,338 acres, the least of any alternative. Following reclamation of disturbed sites, the projected long-term disturbance acreage is 47,232 acres (see Appendix M). Under Alternative B, an estimated 92 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Green River Basin Uplands soil group, where the majority of the highly erodible soils occur.

This alternative allows the fewest acres subjected to surface disturbance and protects the most acres within the Floodplains and Green River Basin Uplands, and Overthrust Belt soil groups resulting in the least erosion potential and the best long-term soil productivity of the alternatives. Moreover, the

prohibition of surface-disturbing activities on highly erosive soils with 10 percent or more slopes without adequate mitigation measures and other fragile soil areas will result in improved protections and reduce accelerated erosion rates, as compared to Alternative A.

Surface-Use Activities. Management of surface use activities under Alternative B is more stringent compared to Alternative A, resulting in increased protections from accelerated soil erosion. For example, compared to Alternative A, seeding of salvaged topsoil piles is required upon completion of construction activities, and surface disturbance during fire suppression is not allowed without the consent of the authorized officer.

Proactive Management Actions. Compared to all alternatives, management actions on public lands under Alternative B are the most protective of soil resources. Moreover, identifying other Management Areas (MAs) under Alternative B may further protect soils from accelerated erosion in some areas.

Alternative C

Surface-disturbing Activities. Under Alternative C, the potential for adverse impacts to soils through reduced stability and productivity and increased compaction is the same as that described for Alternative A. The projected short-term disturbance acreage (172,967 acres) and long-term acreage (144,467 acres) from BLM actions under Alternative C will be the second highest of all alternatives (see Appendix M). Under Alternative C, an estimated 28 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Floodplains and Green River Basin Uplands soil groups, where the majority of highly erodible soils occur. Standard BMPs and mitigation guidelines, combined with development restrictions on slopes greater than 25 percent, are the same as under Alternative A.

Surface-Use Activities. Management of surface-use activities under Alternative C is similar to that as described under Alternative A, resulting in similar impacts to soils.

Proactive Management Actions. Under Alternative C, proactive management actions anticipated to avoid, reduce, or minimize adverse impacts to soils are similar to or slightly greater than those described under Alternative A. Adverse impacts to soils under Alternative A are, therefore, anticipated to be similar to or slightly greater compared to Alternative A.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, the potential for adverse impacts to soils through reduced stability and productivity and increased compaction is less than described for alternatives A and C. The projected short-term disturbance acreage (147,262 acres) and long-term acreage (77,541 acres) from BLM actions under Alternative D will be less than that predicted for Alternative A (see Appendix M). Under Alternative D, an estimated 46 percent of the planning area's federal mineral estate is administratively unavailable for oil and gas leasing or has major constraints. The most protected land is within the Floodplains, Green River Basin Uplands, and Overthrust Basin soil groups, where the majority of the highly erodible soils occur. Standard BMPs and mitigation, combined with development restrictions on slopes greater than 20 percent, are anticipated to be slightly more effective in mitigating impacts to soils compared to alternatives A and C.

Surface-Use Activities. Management of surface-use activities is similar to that as described under Alternative A, resulting in similar impacts to soils.

Proactive Management Actions. Under Alternative D, proactive management actions anticipated to avoid, reduce, or minimize adverse impacts to the soil resources are greater than those described under Alternative A and slightly less than those for Alternative B.

4.1.2.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to determine the potential impacts to soil resources. Meaningful differences in long-term disturbance acreage, fire-suppression tactics, lands that are administratively unavailable or allow NSO relative to fluid minerals on steep slopes, and reclamation requirements form the basis for the following conclusion. Alternative B is anticipated to produce the least potential adverse impacts to soil resources because management actions are anticipated to result in less soil disturbance and potential soil compaction. Therefore, Alternative B is anticipated to conserve more soil resources. Alternative D is anticipated to produce more soil compaction and erosion relative to Alternative B, but will potentially result in somewhat less adverse impacts to soil resources than alternatives A and C. The alternatives listed in ascending order from the least potentially adverse to the most potentially adverse in terms of impact on soil resources are Alternative B, D, C, A.

4.1.3 Water

This section describes impacts to surface water quality, surface water quantity, and groundwater quality and quantity. For this analysis, short-term impacts include those actions that degrade surface water quality, change surface water flows, or change groundwater quality and quantity as a result of unstable soils or poor watershed condition until revegetation or other reclamation can be established (up to 5 years). Refer to Map 7 for water resources.

Surface Water Quality

Direct impacts to surface water quality result from activities that degrade the ambient water quality of surface waters in the planning area. Indirect impacts include actions that disturb soil, especially highly erodible soil. Indirect impacts to surface water quality also may result from activities that modify drainages in the planning area. For example, actions that change the number of road-stream crossings or the distribution and condition of wetlands and riparian areas could indirectly result in changes to surface water quality. Healthy wetlands and riparian areas filter sediments and some pollutants contained in runoff before they enter the stream system.

Actions that minimize, reduce, or prevent offsite erosion or the disposal of supplemental water that is of lower quality than the ambient water quality of the receiving water would diminish adverse impacts to surface water quality. An adverse impact to water quality would result from any action that violates state water quality standards or adversely impacts a designated beneficial use. Surface-disturbing activities (Appendix M) that contribute to offsite erosion and sediment delivery also are considered direct adverse impacts. Long-term impacts to surface water quality are those that result from long-term (more than 5 years) bare ground or water disposal that increase sediment loads or degrade water quality.

Surface Water Quantity

Impacts to surface water quantity include those that reduce or supplement streamflows and may either be beneficial or adverse, depending on the quantity and the location of the withdrawal(s) and (or) discharge(s).

Direct impacts to surface water quantity result from activities, watershed conditions, or treatments (vegetative and physical treatments, impoundments, retention and detention structures, etc.) that increase or decrease the volume and quality of runoff or alter runoff timing. Direct impacts can be the result of

adding or modifying water withdrawals from the drainage system. Indirect impacts to surface water quantity result from activities that modify the capacity of stream channels, runoff from watersheds, or result in changes to the amount or timing of water flows. For example, changes in the locations of roads that direct surface water runoff into drainages may change timing and amount of surface water flowing in a stream system. The distribution and conditions of wetlands and riparian areas influence surface water quality and quantity by affecting the capacitance and water storage of the watershed which, in turn, influences flow energies, erosive potential, and aquatic habitat.

Groundwater Quality and Quantity

Direct impacts to groundwater quality and quantity could result from changes in the numbers, uses, or conditions of wells, including those for water supply, water disposal, and oil and gas, as well as the number of springs developed, water conservation efforts, and the amount and quality of surface water that infiltrates the ground before flowing to the surface water system. Indirect impacts to groundwater quality and quantity result from activities that modify the areas or sources that recharge the groundwater system. For example, activities that decrease vegetative cover in floodplains, riparian and wetland areas, all considered to be local groundwater recharge areas, or that increase runoff away from these areas would reduce the infiltration of precipitation and, thus, reduce groundwater recharge. Changes to ground water quality and quantity in aquifers that are connected to the surface could substantially affect surface water quality and quantity as well.

Long-term impacts to groundwater quality and quantity are those that result from permanent facilities; nonreversible contamination events; landscape alterations that modify groundwater recharge, including wells that deplete the aquifer through extraction; facilities that are paved to eliminate surface water infiltration; undesirable releases of lower quality water or other substances that may not be readily remediated; or wells that are used to inject water (disposal wells) into the groundwater system.

4.1.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The state of Wyoming has primacy with regards to water. This includes water quality standards and water rights. The BLM may use water as an indicator or management tool but it does not directly manage water.
- Surface disturbance (Appendix M) can affect surface water quality by increasing sediment movement, which is ultimately transported to streams and by reducing infiltration, which affects surface and groundwater quality, quantity, and timing. Surface disturbance in areas of highly erosive soils is an action more likely to increase sedimentation in streams than many others.
- The primary sources of surface disturbance from mineral development are roads and well pads for oil and gas and the disturbance created by solid mineral mining.
- Livestock usually create less overall disturbance than other developments, but the tendency for livestock to concentrate in riparian areas and in the proximity of open water while simultaneously impacting riparian vegetation may increase the extent of the influence for this type of disturbance.
- The Colorado River Basin (1st-level hydrologic unit code [HUC] 14) contains the largest portion of the planning area and is projected to contain the greatest number of oil and gas wells in the planning area.
- The extent of unsurfaced roads (i.e., those without gravel or other added surface material) is an indicator of the relative quantity of sediment delivery that may impact surface water quality within each watershed (Furniss et al. 2000). New unsurfaced roads are likely to be constructed to

access new oil and gas wells, so an increase in projected oil and gas wells is associated with an increase in roads.

- All other aspects being equal, the more susceptible a soil is to erosion the more likely it is to adversely impact surface water quality if disturbed. Erosive soils are difficult to protect through the implementation of standard BMPs. Due to the lack of soil surveys in the planning area, the locations of highly erodible soils have not been mapped and must be determined on an individual project basis. As described in the soils section, the Green River Basin Uplands soil group, located within the Colorado River Basin, contains the majority of erodible soils in the planning area and is the region projected to have the most oil and gas development and associated surface disturbance.
- Erosion contributes to sedimentation if it results in sediment delivery to the surface water drainage system. The amount of sedimentation is determined by many factors, including the amount of disturbed surface, the type of soil, the amount and timing of water sufficient to create overland flow, the proximity to established channels, the density and vigor of the vegetative community, and the effectiveness of erosion-control measures, such as BMPs. The buffering capacity of the land over which the water flows before reaching drainage also has a marked influence.
- Most produced water in the planning area is saline and requires disposal by injection at approved facilities or treatment to state water quality standards prior to surface disposal. Additional pipelines or trips to transport produced water to centralized locations for deep-well injection or treatment and disposal at a few points may result from limits on surface disposal.
- Surface applications of limited volumes of appropriate quality water strictly for reclamation may be considered in specific cases under some alternatives with approval from the State of Wyoming.
- The parts of the planning area with depths to groundwater of less than 100 feet are considered the most likely to be adversely affected by surface-disturbing and other activities. The shallower the depth to water, the more sensitive an aquifer is to contamination (Wyoming Geographic Information Science Center 2003).

4.1.3.2 Analysis of Alternatives

The following analysis focuses on potential short-term and long-term impacts to surface water and groundwater quality and quantity projected because of allowable uses and management actions proposed under each alternative. The proposed management of the following resource programs have higher potential to affect (beneficially or adversely) water resources: cultural resources, fire and fuels management, fish and wildlife, special status species, forestry, INNS, minerals (including oil and gas), National Historic Trails (NHTs), OHV use, paleontology, rangeland and livestock grazing, recreation, soils, special designations and other management areas, transportation, and vegetation.

Impacts Common to All Alternatives

Based on the definitions, methods, and assumptions described above, the potential impacts of each alternative are described below. The following analysis of alternatives is organized according to the impacts of activities associated with each alternative. Impacts common to all alternatives are not repeated in the analysis of individual alternatives.

Surface Water Quality

Actions that compact or otherwise destroy soil structure or damage or remove vegetation and loosen the surface soil could cause increased soil erosion and sedimentation to the surface water system. Eroded soil that reaches surface water channels is a direct source of impaired surface water quality and may increase the likelihood of secondary impacts, such as increased potential for bacterial contamination and nutrient

enrichment of water bodies. The amount of sediment delivered to a stream depends on many factors (e.g., slope length and gradient, vegetative cover and type, and density of the drainage network), all of which can result in deposition of the sediment before it reaches drainage (also called buffering).

Roads intercept surface water runoff on the landscape and often direct flows to drainages through ditches and culverts. If roads are unsurfaced, runoff flowing down a road often picks up sediment that is then deposited in the surface water system at stream crossings or at culverts and water bars. Alternatives that increase the density of roads in a watershed, especially unsurfaced roads, are anticipated to increase sedimentation. Roads also may act as conduits for directing contaminants from vehicles and resource management activities (e.g., pesticide applications) into the surface water system (Furniss et al. 2000).

Oil and gas development is the surface-disturbing activity with the greatest variation across the alternatives and is used as an indicator of potential impacts to surface water quality. The projected well numbers vary, but the proportion of total wells is similar across the alternatives, with the majority of all projected oil or gas wells located within the Colorado River Basin. Areas with higher levels of constraints on surface-disturbing activities from oil and gas development would provide greater protection to surface water. Table 4-5 summarizes the projected oil and gas wells and constraints by alternative and river basin.

Table 4-5. Projected Oil and Gas Development and Constraints by River Basin Under Each Alternative

Alternative	Projections in the Kemmerer Planning Area	Colorado River Basin (14)	Bear River Basin (16)	Snake River Basin (17)	5th-level Watershed with Highest Acreage of Constraints
A	% of Projected Oil and Gas Well Pads	95%	2%	3%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	7%	7%	0%	Lower Blacks Fork (1404010708)
	Major Constraints (% of River Basin with Constraints)	22%	26%	0%	Slate Creek (1404010302)
	Moderate Constraints (% of River Basin with Constraints)	55%	50%	64%	Greys River (1601010109)
B	% of Projected Oil and Gas Well Pads	96%	2%	2%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	43%	72%	32%	Twin Creek (1601010109)
	Major Constraints (% of River Basin with Constraints)	47%	25%	65%	Muddy Creek (1404010801)
	Moderate Constraints (% of River Basin with Constraints)	9%	3%	3%	Lower Hams Fork (1404010707)
C	% of Projected Oil and Gas Well Pads	95%	2%	3%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	7%	7%	0%	Lower Blacks Fork (1404010707)
	Major Constraints (% of River Basin with Constraints)	21%	25%	0%	Slate Creek (1404010302)
	Moderate Constraints (% of River Basin with Constraints)	56%	51%	64%	Upper Hams Fork (1404010706)
D *(Proposed RMP)*	% of Projected Oil and Gas Well Pads	95%	2%	3%	–
	Administratively Unavailable for Leasing (% of River Basin with Constraints)	7%	24%	0%	Lower Blacks Fork (1404010708)
	Major Constraints (% of River Basin with Constraints)	37%	28%	0%	Slate Creek (1404010302)
	Moderate Constraints (% of River Basin with Constraints)	52%	45%	100%	Upper Hams Fork (1404010706)

Under all alternatives, efforts to minimize sedimentation through implementing, inspecting, and maintaining BMPs and developing and implementing SWPPPs containing erosion and sediment control plans, as required under the WYPDES Storm Water Program are applied. Water management plans for surface disposals of produced water include reclamation strategies and mitigation, monitoring to track changes in receiving channels, and minimizing adverse impacts to watershed health. Monitoring rangeland condition is used to determine what management actions are needed to minimize the amount of erosion that could affect surface water quality. WYPDES permits required by the State of Wyoming regulate discharges to surface waters of the state (BLM 2004g).

BLM water-monitoring activities are carried out primarily in support of specific management activities. This monitoring is used to measure the presence and magnitude of impacts (both beneficial and adverse), the effectiveness of mitigation measures, and as a mechanism to drive adaptive management. The Wyoming DEQ has an ongoing monitoring program (Wyoming DEQ 2006) designed to (1) determine the overall quality of the waters of the state, (2) determine the extent of water quality changes over time, (3) identify problem areas and areas in need of protection, and (4) determine the effectiveness of existing clean water programs.

Produced water is that water which is transported to the surface as a result of mineral activities. Most produced water in the planning area does not meet Wyoming DEQ standards for surface disposal (DiRienzo 2007). Avenues for disposal of untreated produced water include deep well injection or treatment and discharge. Disposal of produced water, that meets Wyoming DEQ standards for surface disposal, to stream channels on BLM managed lands will either be prohibited or tightly controlled (Appendix D) depending on the alternative.

Surface discharges of produced water from oil and gas wells are permitted by the Wyoming DEQ through a WYPDES permit that requires compliance with specific water quality standards to assure the produced water quality disposed on the surface is suitable for beneficial uses, such as agricultural and livestock, and does not result in a violation of water quality standards in the receiving stream. During the BLM's authorization process of activities that could result in the discharge to surface waters of the state, the BLM may stipulate additional restrictions or prohibitions to water discharges if the discharge affects or could affect the health and function of public lands.. The Colorado River Salinity Control Act provided additional guidance with regard to the reduction of salt production within the Colorado River Basin. Adverse impacts to surface water quality from oil and gas are minimized under all alternatives by following standard practices, BMPs, and guidelines for surface-disturbing activities and surface disposal.

Surface Water Quantity

When watersheds lack sufficient vegetation (especially grasses, forbs, and residual litter), surface infiltration into the soil decreases, causing more runoff to reach the stream system. Conversely, activities such as reclamation and proper grazing management can improve vegetative cover and channel morphology, resulting in increased opportunity for soil surface stabilization and properly functioning stream channels and water infiltration. As surface disturbance increases, so does the amount of bare ground, compacted soils, and possibly less-pervious areas in a watershed. The greater the amount of surface disturbance, the greater the chances are that more surface water runoff reaches streams in a shorter period of time, which increases the potential for water quality degradation, sedimentation, and the frequency of flooding or erosive velocities from high flows in channels. Working toward and maintaining proper functioning condition as a minimum condition in riparian areas and complying with the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) creates conditions that increase infiltration of surface water flows, filter out sediment before it reaches drainages,

reduce runoff, improve vegetation, keep water on the land longer, and lower peak flows in the surface water system.

Disposal options for produced water from oil and gas wells include containment, enhanced infiltration, reinjection, or, if it meets Wyoming state water quality standards and does not negatively affect public land health and function, surface disposal.

Groundwater Quality and Quantity

Potential sources of groundwater contamination may come from point sources, such as chemical spills, chemical storage tanks (aboveground and underground), industrial sites, landfills, oil and gas well sites (including reserve pits), damaged and (or) aging well bores, oil and gas detention and retention ponds, and mining. The possibility of impacts to groundwater quality and quantity exists because of improper well casing and cementing techniques, dewatering coal mines, undetected or unreported spills, or leachate migration from trona settling ponds or produced water pits (BLM 1997a). Other possible sources of groundwater contamination may come from nonpoint sources, such as household septic tanks, roadways, and agricultural activities. Groundwater quality is most susceptible to pollution where the aquifer is shallow because there is less opportunity for filtering by the soil and bedrock.

Alternative A

Surface Water Quality

Over the long term, it is projected that BLM actions under Alternative A will disturb 144,673 acres (see Table 4-1). Under Alternative A, 95 percent of the projected oil and gas development will occur in the Colorado River Basin, which also contains the highest proportion of erodible soils, lands administratively unavailable for leasing, or major constraints. Associated with the concentrations of new oil and gas wells will be road and pipeline construction, which is likely to increase sediment delivery to the Colorado River. The constraints serve to minimize sediment delivery because of surface-disturbing activities in at least 30 percent of the Colorado River Basin.

Proposed activities resulting in surface disturbance that could contribute sedimentation include oil and gas development; the mining of coal, trona, salable, and locatable minerals; the development of wind-energy sites; construction of reservoirs, pits, or wells for wildlife and livestock use; and vegetation treatments. Compliance with federal and state laws and regulations regarding the protection of floodplains, wetlands, and surface water quality will minimize adverse impacts through implementing standard BMPs and mitigation measures under normal conditions.

Surface Water Quantity

Alternative A contains relatively few constraints on activities that could result in soil compaction and vegetation removal, as indicated by the fact that more than 70 percent of the land has moderate or only standard lease form constraints on oil and gas leasing. Therefore, it is anticipated that surface water flows would increase throughout the planning area, but especially in the Colorado River Basin, where most of the surface disturbance is projected. Supplemental flows associated with produced water are expected to be relatively minor and localized due to strict limitations on surface disposal on public land.

Groundwater Quality and Quantity

Alternative A has a high potential for soil compaction, vegetation disturbance, and road construction, all of which will reduce the amount of precipitation that infiltrates the ground to recharge shallow and deep aquifers. Pitless technology for drilling operations most likely will not be prevalent, so the opportunity for contaminants to enter the groundwater will be the highest under this alternative, but low overall due to

regulations by the Wyoming Oil and Gas Conservation Commission (WOGCC) and site-specific analyses done at the time of permitting.

Alternative B

Surface Water Quality

Alternative B projects the least long-term surface disturbance (47,232 acres) relative to other alternatives. Compared to Alternative A, there are fewer opportunities for surface-disturbing actions due to oil and gas development because fewer wells and associated roads are projected with a higher proportion of land that is administratively unavailable or contains major constraints. Areas within ¼ mile of water bodies and wetlands are designated as NSO for fluid minerals to protect these resources and those that depend on them. More actions are designed to minimize stream bank erosion. Damaged wetlands will be restored, resulting in improved trends over the long term. This protection also results in the fewest adverse impacts to water quality, especially in the Colorado River basin.

Surface Water Quantity

Alternative B will result in the least amount of change to surface water quantity due to the fewest projected number of oil and gas wells and the prohibition of surface disposals of produced waters on federally administered soil resources, which protects local streams. In addition, the prohibition would apply to federally produced water disposal on private surface.

Groundwater Quality and Quantity

Alternative B has the least potential for oil and gas development, soil compaction, and vegetation disturbance of any alternative. Requiring the lining of reserve pits and secondary containments on all facilities where oil or hazardous materials are stored or potential releases may occur, minimizes adverse impacts on groundwater quality from oil and gas operations. Alternative B also provides greater protection of floodplains where the groundwater is shallow and vulnerable to contamination, resulting in more protection for groundwater quality and quantity.

Alternative C

Surface Water Quality

This alternative has slightly smaller predicted short-term disturbance acreage than Alternative A, so it would be expected to have less surface water quality impacts. Relative to the other action alternatives (alternatives B and D), surface water quality may sustain greater adverse impacts by increased sedimentation and other contaminants under Alternative C because it has fewer constraints on surface disturbance.

Surface Water Quantity

Alternative C impacts to surface water quantity are slightly greater but similar to those under Alternative A.

Groundwater Quality and Quantity

Overall, Alternative C impacts to groundwater quality and quantity are slightly greater but similar to those under Alternative A.

Alternative D (Proposed RMP)

Surface Water Quality

The potential for adverse impacts to surface water quality through reduced soil stability and increased sedimentation and other contaminants in the surface water system under Alternative D are slightly less than that described under alternatives A and C, but greater than that for Alternative B. Surface-disturbing activities are designed to minimize stream bank erosion, fewer roads are likely to be constructed, and surface disturbance is limited on more steep areas than under Alternative A.

Surface Water Quantity

Alternative D has similar impacts to surface water quantity as Alternative A, but requires additional approval for surface water disposals.

Groundwater Quality and Quantity

Compared to other alternatives, Alternative D has the second lowest potential for short-term and long-term soil compaction and vegetation disturbance, which reduces the amount of precipitation that infiltrates the ground to recharge shallow and deep aquifers. Potential adverse impacts to groundwater quality also are minimized through the lining of reserve pits and chemical contaminant areas, and are less than under alternatives A and C.

4.1.3.3 Conclusion

Differences in long-term surface disturbance acreage due to projected numbers of oil and gas wells and associated roads; variations in protection of floodplains, riparian areas, and wetlands; controls on lining of reserve pits and chemical contaminant areas; and produced water disposal form the basis for the following conclusion. Alternative B potentially will result in having the least adverse impacts to water resources because management actions under this alternative provide greater protections to surface water and groundwater quality and quantity. Alternative A would have the greatest impacts and fewest protections. Alternative C, with the second-most projected surface disturbance acres, but allowing fire suppression chemicals to be used near water, allowing building of permanent facilities in 100-year floodplains, could have more adverse impacts to surface water quality than Alternative A. The impacts under Alternative D, with less projected surface disturbance and increased protections to stream banks, floodplains, and groundwater, are similar to, but less than, the impacts from alternatives A and C. In ascending order from the least potentially adverse to the most potentially adverse impacts on water resources, the alternatives rank as follows: Alternative B, D, C, and A.

4.2 Mineral Resources

4.2.1 Locatable

Unlike leasable minerals (e.g., oil and gas or coal) or salable minerals (e.g., sand and gravel), in which issuance of a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is initiated by the mining claimant. The regulations as stated in 43 Code of Federal Regulations (CFR) 3809 manage surface-disturbing activities on mining claims. For exploration activities other than casual use disturbing 5 acres or less, the claimant is required to submit a Notice of Intent (NOI) to the BLM. For exploration involving more than 5 acres and for actual mining operations—regardless of acreage—the claimant must submit a plan of operations (POO) for approval by the BLM before mining operations can begin. Different regulations apply to mining claims on lands in the National Forest System, National Park System, and the National Wildlife Refuge System; or on BLM-administered lands under wilderness review. If a mining claimant's operation is located on lands patented under the Stock Raising Homestead Act and no written surface owner consent exists, then a POO must be submitted for BLM approval. When the surface owner's consent has been obtained, the claimant does not need to submit an NOI or obtain POO approval.

Actions that could occur through implementing an alternative may affect access to locatable minerals. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires development activity to be conducted so that it is not readily apparent.

4.2.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Potential for locatable bentonite development activity is very low for the planning period.
- The potential for locatable uranium development activity is very low for the planning period.
- The potential development activity for other locatable metallic minerals is also very low for the planning period. Although small deposits of metals in the planning area exist, no economically significant discoveries have occurred, and little activity is anticipated during the life of the RMP.
- The areal extent of fire clay was not mapped in a Geographic Information System (GIS) format and is included in this analysis in a general way only. Other than the two existing mines, the potential development activity for locatable fire clay is very low for the planning period.
- Current production and demand for building stone and moss rock is expected to continue. However, this is dependent on the growth rate in the building industry as well as other economic factors.
- Other than limited hobby collection, the planning area has had no development of gemstones, and no production is expected during the planning period.
- The potential for occurrence of locatable minerals exists across the planning area, although not necessarily in commercial quantity or quality.
- Any alternative that limits locatable mineral development (i.e., reduces the area available for development) will have some adverse impact on the potential mining of locatable minerals.
- Restrictions on resource uses apply to the life of the RMP, but can be changed by amending the RMP.

- The 43 CFR 3809 regulations manage surface-disturbing activities on mining claims.
- Building stone can be either locatable or salable. If not subject to the mining law, then it is considered salable.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

4.2.1.2 Analysis of Alternatives

Allowable uses and management actions that could impact locatable mineral exploration and development activities include withdrawal from locatable mineral entry and restrictions to protect other resource values.

Impacts Common to All Alternatives

Restrictions (e.g., withdrawals) on locatable mineral exploration and development activities result in adverse impacts for all alternatives; however, the intensity of impacts is anticipated to vary by alternative. Therefore, adverse impacts to locatable minerals from specific actions are described under the individual alternatives. In general, the greater the acreage withdrawn from locatable mineral entry, the greater the adverse impact is to the resource. Most of the existing locatable mineral entry withdrawals are due to conflicts with other mineral resources, such as phosphate, coal, and oil shale. Surface-disturbing, timing, and surface-use restrictions may place additional limits on the ability of claimants to develop locatable minerals, but these are relatively minor adverse impacts compared to areas withdrawn from locatable mineral entry. However, in some cases, the cumulative effect of those restrictions could limit an operation to the point that it is uneconomic to proceed.

Alternative A

Withdrawals that existed prior to the 1986 Kemmerer RMP withdrew select federal mineral estate in the planning area from locatable mineral entry for the protection of oil shale, coal, and phosphate resources. These withdrawals adversely impact locatable minerals by limiting where exploration and development may occur. No additional restrictions on locatable mineral development exist under Alternative A.

Alternative B

A total of 940,220 acres are withdrawn from locatable mineral entry under Alternative B to protect resource values in the following areas:

- Developed campgrounds
- The federal section containing Bridger Antelope Trap
- Areas with special status plant and wildlife species
- Cokeville Meadows National Wildlife Refuge (NWR)

Some of the areas withdrawn from locatable mineral entry under Alternative B overlap with areas currently withdrawn, so the withdrawn acres in alternatives A and B are not additive. However, the additional acres withdrawn under Alternative B further reduce the area where exploration and development of locatable minerals may occur and, thus, result in a greater adverse impact compared to Alternative A.

Alternative C

Areas withdrawn from locatable mineral entry under Alternative C are the same as Alternative A; however, the BLM will initiate procedures to lift existing locatable mineral withdrawals under Alternative C. In addition, no new mineral withdrawals will be considered under Alternative C. Although withdrawn acreage is the same as Alternative A, lifting existing locatable mineral withdrawals under Alternative C will increase the area available and, therefore, benefit exploration and development of locatable minerals compared to Alternative A.

Alternative D (Proposed RMP)

In addition to the withdrawals identified in Alternative A, 1,985 additional acres are withdrawn under Alternative D to protect resource values in the following areas:

- Developed campgrounds
- The federal section containing Bridger Antelope Trap
- Areas with special status plant species
- Cokeville Meadows NWR.

Additional acres withdrawn under Alternative D reduce the area where exploration and development of locatable minerals may occur and, thus, result in a greater adverse impact compared to Alternative A, but less than for Alternative B.

4.2.1.3 Conclusion

Based on acres withdrawn from locatable mineral entry, Alternative B has the greatest adverse impact on locatable minerals development. Alternative C would lift some of the areas currently withdrawn from locatable mineral entry, thereby benefiting locatable minerals development. Most of the existing locatable mineral withdrawal is due to presence of other mineral resources, including coal, phosphate, and oil shale. Based on acreage withdrawn from locatable mineral entry under each alternative, the alternatives with the most to least adverse impact on locatable minerals development are alternatives B, D, A, and C.

4.2.2 Leasable – Oil and Gas

Management actions implemented to protect other resource values may directly and indirectly impact new oil and gas leases, exploration, and development. A direct impact is one that either specifically prohibits or permits oil and gas leasing, exploration, or development. An example of a direct impact is the administrative decision to identify areas as administratively unavailable for new oil and gas leasing. Management actions that do not explicitly permit or prohibit oil and gas exploration and development activity, but may influence a company's decision on whether to proceed with a given project, are considered indirect impacts. Indirect impacts are the result of management actions that may place or remove restrictions or additional requirements on oil and gas exploration and development. An example of an indirect impact is a controlled surface use (CSU) restriction preventing certain activities to protect a wildlife habitat area. Short-term impacts occur in less than 5 years. For example, a timing limitation stipulation (TLS) or other seasonal restrictions may result in short-term impacts. Long-term impacts occur beyond the first 5 years and perhaps for the duration of the management plan. Administrative decisions to identify areas as administratively unavailable for oil and gas leasing result in long-term impacts if the decision exceeds 5 years. Refer to Maps 8 through 11 and Maps 8A through 11A for leasable oil and gas alternatives.

4.2.2.1 Methods and Assumptions

The impact analysis used the following methods and assumptions:

- Analysis considered the baseline total unconstrained oil and gas development potential taken from the Reasonable Foreseeable Development (RFD) scenario for oil and gas (BLM 2006b) as summarized in Chapter 3 and applied the alternative constraints from the other resource programs as described in Chapter 2. The RMP will not modify existing leases; as old leases expire and new ones are issued, new leases would be subject to relevant stipulations. However, site-specific conditions of approval can be applied to applications for permit to drill (APDs) to avoid adverse impacts to resource values by development on existing leases per 43 CFR 3101.1-2.
- About 1,577,402 acres of federal mineral estate in the planning area have a moderate-to-high potential for the occurrence of oil and gas. Most of the planning area has a low development potential for oil and gas (BLM 2006b).
- Approximately 917,785 acres of federal mineral estate currently are leased in the planning area. Development of current leases under this RMP is subject to provisions in 43 CFR 3101.1-2.
- Where existing oil and gas leases occur, NSO restrictions for fluid minerals cannot be applied to the entire leasehold, as development must be allowed consistent with existing lease terms.
- The BLM can permit geophysical exploration activities in more restrictive visual resource management (VRM) areas because the operations are short-term activities.
- Geophysical permitting will be done on a case-by-case basis.
- Other federal agencies administer lands in Fossil Butte, Cokeville Meadows, and Seedskadee National Wildlife Refuge that include areas that are administratively unavailable for oil and gas leasing. However, the majority of Fossil Butte National Monument currently is leased, and a separate Land Use Plan provides guidance for future decisions regarding leasing.
- Areas administratively available for oil and gas leasing subject to major constraints have more adverse impacts on oil and gas leasing, exploration, and development compared to acres subject to either moderate constraints or standard stipulations. All areas identified as administratively available for oil and gas leasing are also referred to as "open" in this document and are subject to standard stipulations. In addition, some of these areas are subject to moderate and (or) major constraints.
- Moderate constraints are any stipulations which may restrict the timing or placement of an oil and gas development, but would not restrict the overall development. Moderate stipulations include all timing restrictions that by themselves or overlapping would not restrict the timing of development beyond 6 months, or would not require directional drilling techniques for more than ¼ mile (e.g., NSO for fluid minerals in specific sensitive plant populations, all wildlife restrictions where only one restriction occurs, restrictions on development of slopes greater than 25%).
- Major constraints are any stipulations which may restrict the timing or placement of oil and gas developments and may result in an operator dropping the development proposal. Major stipulations include timing restrictions that by themselves or overlapping would result in a timing restriction greater than 6 months regardless of any other less restrictive constraints in the same area. Also, restrictions that would require the use of directional drilling to reach targets over ¼ mile away (e.g., greater than ¼-mile NSO for fluid minerals, big game crucial winter range overlapped with raptor buffers, where developments are prohibited on slopes greater than 10% , etc.) are considered "major."

- The RFD scenario for oil and gas (BLM 2006b; BLM 2008a) based development potential on the anticipated drilling activity over the next 20 years, with most of the development occurring as infill wells in existing fields.
- Moderate and major constraints identified for each alternative (see Chapter 2) were applied to the unconstrained RFD scenario for oil and gas development to develop Maps 8 through 11 and the RFD scenario for oil and gas development for each alternative.

4.2.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

Under the regulations of 43 CFR 3150, the BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the WOGCC is responsible for authorizing all operations on state and private surface. Geophysical operations which are entirely within a given lease may also be approved under 43 CFR 3160 regulations, via sundry notice (form 3160). The information gained from geophysical exploration reduces the number of dry holes drilled during the field development stage, resulting in less unnecessary surface impacts and fewer impacts to other resources.

Areas within the planning area are classified as either administratively unavailable for oil and gas leasing or administratively available for oil and gas leasing and either subject to standard stipulations, or subject to moderate or major constraints. The Raymond Mountain Wilderness Study Area (WSA) and the Mechanically Mineable Trona Area (MMTA) are administratively unavailable for oil and gas leasing under all alternatives. The area administratively available for oil and gas leasing subject to constraints varies by alternative.

Major constraints, such as NSO restrictions for fluid minerals, have the potential to adversely impact oil and gas exploration and development on new leases. For example, operators typically drill oil and gas wells vertically because the costs are lower and drilling problems are less likely. In some cases, an operator could place a drilling location, access road, or production facility in a less-sensitive area and drill the well directionally to recover reserves underlying the area with the surface-disturbance restriction. Directional drilling, however, is 1.25 to 4 times more costly than vertical drilling, and the increased costs could make some drilling uneconomical. Operators can utilize directional drilling to tap oil and gas reserves on portions or margins of oil and gas leases in large contiguous areas subject to an NSO restriction for fluid minerals and employ this technology to develop isolated lease parcels subject to the same restriction. Since directional drilling has its horizontal limitations, operators could not develop all the oil and gas resources from all the acreage associated with large areas with an NSO restriction.

Impacts from moderate constraints, while adverse, are typically indirect and not as severe as those resulting from major restrictions. Moderate constraints may limit the timing of development activities or require specific mitigation, but they do not necessarily remove the acreage from development or require directional drilling. For example, under a TLS, development may become more intensive over a shorter timeframe to complete operations outside a TLS. In areas with overlapping TLS restrictions for wildlife, operators may be limited to when they can schedule development activities. In some cases, an operator may have to start development and then postpone operations during critical time periods. If the window during which work can be done is too short, a development project may have to be done in phases, requiring more time to complete, adding to the project's cost and prolonging the time before the investment is recovered. A company may decide not to develop the reserves if it considers the project marginal due to the additional requirements and added time and cost. Under BLM policy, however, lease stipulations and COAs are subject to exception, waiver, and modification (see Appendix F). Air emissions from drilling and production activities are allowed up to applicable standards and guidelines, which represent an additional limiting factor for oil and gas development within the planning area. The

authority to issue air quality permits under the Clean Air Act has been designated by the EPA to the Wyoming DEQ.

In portions of the planning area, conflicts have occurred under all alternatives between oil and gas and trona, and may occur in the future between oil and gas and coal. Since 2004, the BLM has been working with industries, regulatory agencies, and other land owners to study and resolve technical and safety issues regarding recovery of overlapping oil and gas and trona resources. The conclusion from the deliberations is that oil and gas development and trona mining are basically incompatible because of the exposure of the underground trona workforce to risks associated with nearby high-pressure gas wells. The preferred course of action is to administer the area exclusively for trona extraction until conventional trona mining is complete. Therefore, an area has been designated, the MMTA, in which oil and gas leasing and development are currently prohibited. The MMTA extends into the Rock Springs Field Office (RSFO) planning area, and would amend the 1997 Green River RMP.

NSO restrictions for fluid minerals for protecting bald eagle winter roosts are the same under all alternatives. This restriction occurs in areas with moderate oil and gas development potential and results in a relatively minor adverse impact to oil and gas. Under all alternatives, geophysical exploration will be allowed throughout the Kemmerer Field Office area on a case-by-case basis.

Alternative A

Areas Administratively Unavailable for Oil and Gas Leasing. Alternative A identifies 104,802 acres, or 7 percent, of federal mineral estate in the planning area as administratively unavailable for oil and gas leasing (Tables 4-6 and 4-7). These acres of administratively unavailable BLM federal mineral estate are intended to protect resource values in the Raymond Mountain WSA and the MMTA; however, they also result in direct adverse impacts to oil and gas development, as less land is available for leasing. Existing oil and gas leases are suspended in the MMTA under Alternative A.

Table 4-6. Acres of Federal Mineral Estate Administratively Unavailable and Available for Oil and Gas Leasing Subject to Constraints by Alternative in the Kemmerer Planning Area

Restriction	Alternative A	Alternative B	Alternative C	Alternative D (Proposed RMP)
Administratively Available with Standard Stipulations Percent (%) of Federal Mineral Estate	337,076 21%	7,718 <1%	360,472 23%	62,036 4%
Administratively Available with Moderate Constraints Percent (%) of Federal Mineral Estate	783,218 50%	118,071 7%	776,850 49%	797,504 50%
Administratively Available with Major Constraints Percent (%) of Federal Mineral Estate	354,266 22%	643,515 41%	337,238 21%	537,341 34%
Administratively Unavailable for Oil and Gas Leasing Percent (%) of Federal Mineral Estate	104,802 7%	810,058 51%	104,802 7%	182,481 12%

Note: Table includes mineral estate under other federal surface, as well as BLM, and includes areas exhibiting no, very low, low, moderate, and high development potential for oil and gas.
Source: BLM 2006a; BLM 2008b
< less than

Table 4-7. Acres of Federal Mineral Estate Administratively Unavailable for Oil and Gas Leasing by Resource in the Kemmerer Planning Area

Resource	Alternative A	Alternative B	Alternative C	Alternative D (Proposed RMP)
Viewshed of Class 1 Trail Segments	0	542,520	0	0
MMTA Area[1]	71,937	71,937	71,937	71,937
Bear River Divide MA	0	147,156	0	74,258
Raymond Mountain WSA	32,880	32,880	32,880	32,880
Rock Creek/Tunp	0	63,278	0	45,863

Note: Due to overlaps in some constraint areas, total acres in this table do not necessarily equal the totals for administratively unavailable acres in Table 4-6. Table includes mineral estate under other federal surface, as well as BLM, and includes areas exhibiting no, low, very low, moderate, and high development potential for oil and gas.
[1] An additional 43,221 acres of federal mineral estate occur in the RSFO. See discussion under Cumulative Impacts Issue 2.
MA Management Area
MMTA Mechanically Mineable Trona Area
WSA Wilderness Study Area

Other Resource Restrictions. Under Alternative A, 1,474,560 acres are administratively available for oil and gas subject to standard stipulations (337,076 acres), moderate constraints (783,218 acres), and major constraints (354,266 acres) (Table 4-6). The relatively small NSO restrictions for fluid minerals associated with slopes greater than 40 percent, bald eagle winter roosting areas, raptor nests, a representative cushion plant community, four populations of *Physaria dornii* (special status plant species), Bridger Antelope Trap, a 400-foot buffer around developed campgrounds, and municipal airport runways are anticipated to have negligible adverse impacts on conventional oil and gas and CBNG development. Potential adverse impacts to exploration and oil and gas development from restrictions on timing of operations and (or) surface-disturbing activities are intended to protect resource values and, under Alternative A, are less than all other alternatives. Overall, the adverse impacts from resource restrictions under Alternative A are similar to Alternative C and less than alternatives D and B, respectively.

Alternative A projects 223 federally permitted CBNG wells and 789 oil and gas wells will be drilled on federal mineral estate in the planning area between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates there will be 180 productive CBNG wells and 686 productive oil and gas wells, resulting in a 19 percent decrease in producing CBNG wells and a 16 percent decrease in other producing wells compared to the unconstrained baseline projection.

Table 4-8. Projected BLM Federal Wells Drilled by Alternative through 2020 in the Kemmerer Planning Area

	Coalbed Natural Gas Wells	Oil and Gas Wells	Total Wells
Projected Wells Drilled (2001 – 2020)[1]			
Baseline – Wells Drilled (Unconstrained)	**274**	**947**	**1,221**
Alternative A – Wells Drilled Percent Reduction from Baseline	223 19%	789 16%	1,012 17%
Alternative B – Wells Drilled Percent Reduction from Baseline	93 66%	410 57%	503 59%
Alternative C – Wells Drilled Percent Reduction from Baseline	227 17%	793 16%	1,020 16%
Alternative D – Wells Drilled Percent Reduction from Baseline	226 18%	784 17%	1,010 17%

Table 4-8. Projected BLM Federal Wells Drilled by Alternative through 2020 in the Kemmerer Planning Area *(Continued)*

	Coalbed Natural Gas Wells	Oil and Gas Wells	Total Wells
Projected Producing Wells (2001 – 2020)[1]			
Baseline – Producing Wells (Unconstrained)	**221**	**811**	**1,032**
Alternative A – Producing Wells Percent Reduction from Baseline	180 19%	686 16%	866 17%
Alternative B – Producing Wells Percent Reduction from Baseline	79 64%	350 57%	429 58%
Alternative C – Producing Wells Percent Reduction from Baseline	184 17%	680 16%	864 16%
Alternative D *(Proposed RMP)* – Producing Wells Percent Reduction from Baseline	183 18%	675 17%	858 17%

Source: BLM 2006b; BLM 2008a

[1]Well counts include federal wells only and do not include existing wells.

BLM Bureau of Land Management

Alternative B

Areas Administratively Unavailable for Oil and Gas Leasing. Alternative B identifies 810,058 acres (51%) of federal mineral estate in the planning area as administratively unavailable for new oil and gas leasing (Tables 4-6 and 4-7). These acres of administratively unavailable federal mineral estate are identified to protect other resource values including contiguous sagebrush, aspen, and mountain shrub habitats. In addition, the Rock Creek/Tunp MA and Bear River Divide MA are identified as unavailable for oil and gas leasing for the life of the land use plan to protect overlapping wildlife habitat and cultural resource values. Compared to all other alternatives, Alternative B identifies the most acreage as administratively unavailable for additional oil and gas leasing and is, therefore, anticipated to have the greatest direct and adverse impact on new oil and gas leasing in the planning area. In addition, Alternative B identifies the MMTA as administratively unavailable for oil and gas leasing until the oil and gas resource can be recovered without compromising the safety of underground miners.

Other Resource Restrictions. Under Alternative B, 769,304 acres are administratively available for oil and gas leasing subject to standard stipulations (7,718 acres), moderate constraints (118,071 acres), and major constraints (643,515 acres) (Table 4-6). Compared to all other alternatives, Alternative B subjects the most area to major constraints and the least area to standard and moderate constraints. Although these restrictions are anticipated to protect resource values, they also are anticipated to have the most adverse impacts on oil and gas development compared to all other alternatives. Restrictions are described in detail in Chapter 2 alternatives. Compared to Alternative A, additional NSO restrictions for fluid minerals under Alternative B include all populations of *Physaria dornii*, a ¼-mile buffer around developed campgrounds, and the Alfred Corum and Nancy Hill emigrant gravesites and Emigrant Spring/Dempsey cultural sites. For existing oil and gas leases, NSO restrictions cannot be applied to the entire leasehold; development must be allowed consistent with existing lease terms. The NSO restrictions for fluid minerals under Alternative B would be applied only to new leases in the areas identified.

Additional restrictions on timing of oil and gas development and (or) surface-disturbing activities under Alternative B are identified to protect resource values, including sensitive and highly erodible soils; ¼-mile buffer around floodplains, wetlands, aquatic habitat, and riparian areas; known locations of special status plant species; fish-bearing streams; greater sage-grouse habitats; pygmy rabbit habitats; white-tailed prairie dog colonies or complexes; seven cultural sites; NHTs; Bridger Butte Area of Critical

Environmental Concern (ACEC); Rock Creek/Tunp MA; Bear River Divide MA; and paleontological sites. The additional NSO for fluid minerals, timing, and surface-disturbance restrictions under Alternative B are expected to have the most adverse impacts on oil and gas development of all alternatives.

Alternative B projects 93 federally permitted CBNG wells and 410 other federal oil and gas wells will be drilled on federal mineral estate in the planning area between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates there will be 79 productive CBNG wells and 350 productive oil and gas wells, resulting in a 64 percent decrease in producing CBNG wells and a 57 percent decrease in other producing wells compared to the unconstrained baseline projection. Operators may have to drill conventional federal wells directionally from existing well pads if sites overlap with floodplain exclusion areas for surface-disturbing activities, the 3-mile buffer zones around greater sage-grouse leks, and 1½-mile buffers outside of raptor nest areas during specified seasons. Compared to all other alternatives, adverse impacts to oil and gas development are greatest under Alternative B.

Alternative C

Areas Administratively Unavailable for Oil and Gas Leasing. Alternative C identifies the same amount of acres of federal mineral estate as administratively unavailable for oil and gas leasing as for Alternative A (Tables 4-6 and 4-7). Therefore, the impacts to oil and gas leasing from the administratively unavailable classification under Alternative C are anticipated to be the same as Alternative A. Alternative C will withhold the MMTA from new fluid mineral leasing and continue the suspension of existing oil and gas leases indefinitely. The withholding could be lifted if future technological innovation allowed for safe development of oil and gas leases. This action would benefit oil and gas development compared to Alternative A.

Other Resource Restrictions. Under Alternative C, 1,474,560 acres are administratively available for oil and gas subject to standard stipulations (360,472 acres), moderate constraints (776,850 acres), and major constraints (337,238 acres) (Table 4-6). Alternative C subjects similar size areas to major and moderate constraints and standard stipulations compared to Alternative A. The similar size area of restrictions is anticipated to result in similar adverse impacts on oil and gas development compared to Alternative A.

Compared to Alternative A, NSO restrictions on oil and gas activities under Alternative C are reduced by eliminating the NSO to protect the representative cushion plant community and four populations of *Physaria dornii*. Under Alternative C, restrictions on the timing of oil and gas activities and (or) surface-disturbing activities are similar to Alternative A. The exception is avoidance of surface-disturbing activities in occupied pygmy rabbit habitats. Compared to all other alternatives, Alternative C proposes the lowest acreage with major constraints on oil and gas leasing. Under Alternative C, adverse impacts to oil and gas leasing from raptor nest and trails restrictions are less than under Alternative A.

Alternative C projects 227 federal CBNG wells and 793 other federal oil and gas wells will be drilled on federal mineral estate between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates 184 productive CBNG wells and 680 productive oil and gas wells. Alternative C results in a 17-percent decrease in producing CBNG wells and a 16-percent decrease in other producing oil and gas wells from the unconstrained baseline projection. The number of producing wells projected under Alternative C is lower than the number projected under Alternative A, and slightly higher than Alternative D. The reduction in wells from the unconstrained baseline projection is mainly attributable to constraints associated with measures to protect wildlife habitat from disturbance.

Alternative D (Proposed RMP)

Areas Administratively Unavailable for Oil and Gas Leasing. Under Alternative D, 182,481 acres (12%) of federal mineral estate are administratively unavailable for oil and gas leasing to protect resource values (Tables 4-6 and 4-7). Alternative D identifies more acreage as administratively unavailable for oil and gas leasing compared to Alternative A. Alternative D restrictions and associated impacts are the same as Alternative C for oil and gas leasing in the MMTA.

Other Resource Restrictions. Compared to Alternative A, changes in NSO restrictions for fluid minerals under Alternative D include removing the NSO for four populations of *Physaria dornii*, increasing the Bridger Antelope Trap area subject to NSO restrictions to 640 acres, adding an NSO restriction to new leases on seven cultural sites, and expanding the NSO buffer area around developed campgrounds to ¼ mile. Overall, the NSO restrictions for fluid minerals under Alternative D are expected to increase resource protection and increase adverse impacts to oil and gas leasing compared to Alternative A. Under Alternative D, restrictions on the timing of oil and gas activities and (or) surface-disturbing activities generally are increased compared to Alternative A. Increased restrictions under Alternative D are identified to protect resource values, including sensitive soils, fish-bearing streams, 160 additional acres of the Bridger Antelope Trap (NSO), and expanding the buffer around Class 1 through Class 3 NHT segments; surface disturbance is prohibited on the Bridger Butte ACEC; and the Rock Creek/Tunp MA and Bear River Divide MA are identified as unavailable to oil and gas leasing for the life of the land use plan. While these timing and surface-disturbing restrictions do not prohibit drilling, operators may have to directionally drill or reschedule drilling to develop the resources, making some ventures unfeasible or uneconomical.

Alternative D projects 226 federal CBNG wells and 784 other federal oil and gas wells will be drilled on federal mineral estate between 2001 and 2020 (Table 4-8). Of these wells, the RFD estimates there will be 183 productive CBNG wells and 675 productive oil and gas wells (an 18% decrease in the number of CBNG-producing wells and a 17% decrease in the number of producing conventional oil and gas wells from the unconstrained baseline projection). The number of wells projected under Alternative D is slightly lower compared to Alternative C.

4.2.2.3 Conclusion

Acres administratively unavailable for oil and gas leasing are lowest under alternatives A and C and highest under Alternative B. The area of potential new leases subject to NSO restrictions for fluid minerals, timing, and (or) surface-disturbance restrictions is also lowest under alternatives A and C and highest under Alternative B. The number of producing wells expected is highest under alternatives A, C, and D and lowest under Alternative B. Taking into account administratively unavailable acres, NSO restrictions, and major and moderate constraints, Alternative C will result in the least potential adverse impacts, followed by alternatives A and D. Conversely, Alternative B will result in the most adverse impacts to new oil and gas leasing, exploration, and development.

4.2.3 Leasable – Coal

Prior to offering federal coal reserves for lease, a screening process, as outlined in 43 CFR 3420.1-4, must be completed. The process includes four screens: coal development potential, unsuitability criteria, multiple-use conflicts, and surface-owner consultation. The area may be offered for lease only after the screening process is completed and the area is determined to be acceptable for further consideration for coal leasing and development. In the Kemmerer planning area, the Haystack Lease By Application is the only one that has recently gone through the coal-screening process. The lease application is addressed in the alternatives (Chapter 2).

Coal leases that were issued prior to the effective date of the Surface Mining Control & Reclamation Act of 1977 are not subject to the coal-screening process. Environmental protection of resource values affected by coal mining are addressed through the mine plan approved by the Secretary and permitting approved by the Wyoming DEQ fulfilling its cooperative agreement responsibilities for the Federal Office of Surface Mining. All the existing coal leases in the Kemmerer Field Office are in that category.

Once the coal reserves are leased, oversight of surface coal mining operations and reclamation in conformance with the approved permit passes to the Office of Surface Mining and the Wyoming DEQ, Land Quality Division. Resource recovery and protection plan approval, minor mining plan approvals, and verifying production tonnage and determining maximum economic recovery remain the responsibility of the BLM. The initial and major mining plan modification approval is the responsibility of the Assistant Secretary for Lands and Minerals and the necessary document (the resource recovery and protection plan) is forwarded to the Assistant Secretary for Lands and Minerals by the Office of Surface Mining along with a copy of the permit.

Actions that could occur through implementing each alternative could affect coal resources. This section describes the impacts of each alternative on coal leasing, exploration, and development and in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse. Direct impacts are the result of actions that either specifically prohibit or permit coal leasing, exploration, or development. An example of a direct impact is the closure of an area to coal leasing to protect another resource. Indirect impacts are the result of actions that may place or remove restrictions or additional requirements on mineral exploration and development. An example of an indirect impact is a viewshed restriction on development activity that, while not preventing development, requires development activity be conducted so that it is not readily apparent. Short-term impacts are those impacts that occur in less than 5 years. A timing or seasonal restriction results in short-term impacts. Long-term impacts occur beyond the first 5 years and perhaps for the duration of the management plan. Closures to coal leasing result in long-term impacts.

4.2.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Coal occurs in various portions of the planning area and development potential is high on certain federal coal leases. As of 2003, approximately 3,963 acres are included in the Haystack Lease By Application being considered as part of the alternatives.
- No additional areas, other than the Haystack Lease By Application area, are currently being evaluated as acceptable for further consideration for coal leasing and development because no other applications have been filed.
- While all BLM-administered lands may be considered open outside the Raymond Mountain WSA for coal exploration, new exploration on unleased lands outside the Haystack area is unlikely during the planning period.
- Coal exploration involves the use of truck-mounted drill rigs and support vehicles to drill shallow core holes. The Chevron Mining, Inc. Kemmerer Mine has the only active exploration on leased federal coal and the company currently is the only holder of federal coal leases in the planning area.
- Restrictions on coal exploration include high coal-occurrence potential areas where no surface-disturbing activities are allowed, or overlapping areas of timing restrictions that result in year-round restrictions.

- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

4.2.3.2 Analysis of Alternatives

The primary decision affecting coal leasing is determined by the screening process (see 43 CFR 3420.1-4) resulting in areas acceptable for further leasing consideration. In addition, allowable uses and management actions with the potential to impact coal exploration and development include restrictions to protect other resource values. As coal exploration and development are affected by the alternatives, coal exploration and development can, in turn, impact other resources. For example, roads built to accommodate development could contribute to habitat fragmentation. The impacts of coal development on other resource topics (e.g., physical, biological, fire and fuels management, etc.) are discussed under their respective impacted resource sections.

Impacts Common to All Alternatives

Approximately six sections of land (3,963 acres) were reviewed to determine their suitability for coal leasing in accordance with the screening process described in 43 CFR 3420.1-4 (BLM 2004b). All six sections of land were determined acceptable for further consideration for coal leasing subject to conditional requirements or mitigation measures; however, this is treated differently under each alternative. The Haystack Coal Lease By Application and existing coal leases within the planning area are shown on Map 12.

Coal exploration on unleased federal mineral estate is subject to the requirements and conditions of the coal-exploration license process, which requires project-specific stipulations and conditions designed to limit impacts from exploration on other resources.

Alternative A

Coal Exploration and Development Impacts

Direct adverse impacts to coal exploration and development may occur from restrictions on surface disturbance or surface-disturbing activities to protect resource values in Bridger Antelope Trap. Approximately 480 acres of Bridger Antelope Trap overlay areas of moderate-to-high potential coal occurrence.

Coal Leasing Impacts

Under Alternative A, any Lease By Application for new coal leases will be processed for areas outside the Raymond Mountain WSA and Raymond Mountain ACEC by applying the coal screening process to the application. At this time, only the Haystack Lease By Application has been received by the BLM.

Alternative B

Coal Exploration and Development Impacts

A GIS analysis identified restrictions on areas that could adversely impact coal exploration or development by not allowing surface-disturbing activities and (or) restricting timing of activities on areas of moderate-to-high coal occurrence potential. Under this alternative, no new coal leasing will be considered. Were the RMP amended and new coal leasing considered, adverse impacts to coal

exploration and development from restrictions to protect resource values would be greater under Alternative B than under any other alternative.

Coal Leasing Impacts

Under Alternative B, no new coal leasing will be considered in the planning area. This management action results in the greatest direct, adverse impact to coal leasing compared to all alternatives.

Alternative C

Coal Exploration and Development Impacts

Other resource restrictions on coal exploration and development under Alternative C are the same as Alternative A. Restrictions have the potential to adversely impact coal exploration or development because surface disturbance or the timing of operations is restricted. Impacts to coal exploration from restrictions under Alternative C are similar to Alternative A and less than those for alternatives B and D.

Coal Leasing Impacts

Impacts to coal leasing and areas acceptable for further consideration for coal leasing and development under Alternative C are the same as those identified under Alternative A. The coal screening process would be applied following Lease By Application submittal. Additionally, federal land within the proposed Haystack Lease By Application project is determined to be acceptable for further consideration for coal leasing and development.

Alternative D (Proposed RMP)

Coal Exploration and Development Impacts

Under Alternative D, additional restrictions on coal exploration and development in moderate-to-high coal occurrence areas compared to Alternative A include the following:

- Bear River Divide MA (17,734 acres)
- Raymond Mountain ACEC (483 acres)
- Rock Creek/Tunp MA (5,607 acres)
- Bald eagle roost buffer areas (seasonal restriction on 1,138 acres)
- Cultural sites (including Bridger Antelope Trap, 640 acres)
- Special status plant species (6 acres)

These restrictions could adversely impact coal exploration or development by restricting surface-disturbing activities and (or) the timing of operations. Adverse impacts to coal exploration and development under Alternative D are similar in nature, but much larger in acreage, compared to Alternative A. Restrictions from other resources apply to the life of the RMP, but can be changed by amending the RMP.

Coal Leasing Impacts

Under Alternative D, BLM-administered lands outside of the Raymond Mountain WSA will be open for new Lease By Application submissions, as under Alternative C except for no coal Leases By Application will be considered within the Rock Creek/Tunp and Bear River Divide MAs . New lease areas would then be subject to the coal screening process. The proposed Haystack Lease By Application area is determined acceptable for further consideration for coal leasing and development (see *Coal Screening*

Summary Report [BLM 2004b]). Under Alternative D, restrictions from other resources could impact coal leasing during the re-application of coal screens.

4.2.3.3 Conclusion

Alternatives A, C, and D have the least potential adverse impacts on coal leasing, exploration, and development because they all allow Lease By Application within the planning area. Alternative B does not allow new coal leasing in the planning area and, therefore, has the greatest impact to coal leasing, exploration, and development activities.

4.2.4 Leasable – Sodium (Trona)

Actions occurring through implementing an alternative could affect new leasing and (or) access to sodium for exploration activities. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent.

4.2.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Potential for sodium exploration and development activity is high for the planning period (see Map 13).
- Any alternative that limits sodium mineral development (i.e., reduces the area available for development) will have some adverse impact.
- Exploration activities could include core drilling to evaluate a deposit's potential.
- Surface restrictions could affect exploratory or tailings injection drilling operations, and placement of permanent surface facilities such as processing plants, tailings ponds, road and mine shafts. Surface restrictions do not affect the actual mining of trona since all mining, either conventional or solution mining, is underground.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

4.2.4.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact sodium mineral development include management actions that result in areas closed to leasing, conflicts with other mineral development including oil and gas, and, to a limited degree, areas of surface use and timing restrictions.

Impacts Common to All Alternatives

The intensity of impacts to sodium leasing and development is anticipated to vary by alternative. Restrictions on timing and surface use may limit activities associated with exploration and development, but these types of restrictions are not expected to prohibit sodium development, since operations typically occur underground. Restrictions on surface-disturbing activities within the MMTA may alter where new surface facilities can be located, but do not preclude construction. In addition, timing restrictions, such as for biological resources (e.g., crucial winter range, greater sage-grouse breeding activities, and raptor nesting) may affect when exploration or new construction may occur. Within the MMTA, the potential

for sodium exploration and development is high, while outside that area the potential for exploration, development, and new leasing is low.

Alternative A

Federal mineral estate outside of the Raymond Mountain WSA is available for sodium leasing consideration and exploration is considered on a case-by-case basis. Restrictions to protect special status plant and wildlife species could adversely impact development of sodium on federal mineral estate if a biological survey finds such species present in the proposed development. Protections are in place for seasonally sensitive areas such as greater sage-grouse leks and brood-rearing areas and raptor nests within the MMTA and may affect new surface facility construction. Cultural resources that occur in the MMTA, including NHT segments with ¼-mile buffers to protect against visual intrusion and surface disturbance, may also impact new facility construction. These restrictions would only affect placement of above-ground facilities associated with trona development. Alternative A has no specific decisions regarding wind energy development, which , if it occurred, could also restrict above-ground trona facilities.

Alternative B

Under Alternative B, planning area lands are open to new sodium leasing, except no new leasing or exploration will be authorized within the Raymond Mountain WSA (as under Alternative A), within the viewshed of Fossil Butte National Monument, and in Rock Creek/Tunp and Bear River Divide MAs. Surface-disturbing restrictions in floodplains could impact sodium development on 73,218 acres of federal mineral estate exhibiting moderate-to-high potential occurrence of sodium. No new permanent facilities will be allowed in floodplains, riparian areas, or wetlands to support sodium mineral development activity under Alternative B, which is more restrictive than under the other alternatives. The seasonal restrictions on surface-disturbing and disruptive activities to protect greater sage-grouse habitats are more restrictive than under Alternative A ("prohibit" disturbance compared to "avoid") and include protections for winter concentration areas. These habitat restrictions may directly and adversely impact about 5,331 acres of federal mineral estate with moderate-to-high potential occurrence of sodium. The restrictions on surface-disturbing activities in NHT buffers within the MMTA are the same as under Alternative A, ¼ mile, but Alternative B includes ½-mile viewshed buffers on these trail segments. Under Alternative B, approximately one quarter of the BLM surface lands within the MMTA are considered to be suitable for wind energy development; therefore, the land available for new surface facilities construction may be less than under Alternative A. These restrictions do not prohibit sodium development, but may affect timing of activities and placement of above-ground facilities to protect resource values.

Surface-disturbing restrictions to protect prairie dog habitats will directly and adversely impact 1,371 acres of moderate-to-high potential occurrence of leasable sodium federal mineral estate. Protection of special status plant and wildlife species could directly impact development of existing sodium leases on federal mineral estate (e.g., placement of above-ground facilities) if a biological survey finds such species present in the proposed development. Alternative B closes areas with special status plant and wildlife species to sodium mineral development, most of which are located in areas exhibiting low potential occurrence of sodium.

Alternative C

Alternative C is the same as Alternative A. Impacts to sodium development under Alternative C are anticipated to be similar to Alternative A as many of the surface-disturbance restrictions are the same, such as for sensitive wildlife species. The NHT trail segments located in the MMTA have smaller buffers (Class 3 at 100 feet on each side of trails) than under alternatives A and B (1/4-mile buffers), which would result in less acreage restricted to new facility construction. However, all of the BLM-

administered surface lands within the MMTA are included in areas determined to be suitable for wind energy development under Alternative C, which may reduce the land available for new surface facilities more than under alternatives A and B.

Alternative D (Proposed RMP)

Impacts to sodium mineral development are anticipated to be similar to Alternative A, with the addition of no new sodium exploration and leasing allowed in the Rock Creek/Tunp and Bear River Divide MAs. Alternative D does not close areas of special status plant or wildlife species to sodium mineral development, which would affect placement of above-ground facilities. Special status wildlife species restrictions are similar to those for Alternative A but include protections for greater sage-grouse winter habitat. Similar to Alternative C, NHT trail segment buffers under Alternative D are Class 3 at 100 feet, smaller than for Alternative A and, therefore, reduce restrictions on new facility locations compared to Alternative A. Areas determined to be suitable for wind energy development within the MMTA are the same as for Alternative C, which may reduce the land available for new surface facilities locations compared to alternatives A and B.

4.2.4.3 Conclusion

Surface disturbance restrictions to protect floodplains and other resource values may impact more acreage under Alternative B compared to the other alternatives. Alternatives C and D are similar to Alternative A, with the least restrictions on sodium leasing and development and the least potential impacts. Within the MMTA, Alternative B has the strongest restrictions on the largest area for special status wildlife species and NHTs, which limits where new trona surface facilities can be located. Alternatives C and D have smaller NHT trail protection buffers compared to Alternative A, yet alternatives C and D have a greater acreage identified as suitable for wind energy (under Alternative A wind energy areas were not identified). Trail protection buffers and areas developed for wind energy may affect where new surface facilities may be constructed.

4.2.5 Leasable – Other Solid Leasables

Actions that could occur through implementing an alternative may affect access to other solid leasable minerals, especially oil shale and phosphate, for exploration and development activities. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires development activity be conducted so that it is not readily apparent.

4.2.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The potential for phosphate exploration and development activity is low for the planning period. Currently, no federal phosphate leases or development activity in the planning area is occurring.
- The potential for oil shale exploration and development activity is low for the planning period due to availability of higher quality oil shale in regions outside the planning area.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).

- Any alternative that limits other solid leasable mineral development (i.e., reduces the area available for development) in areas of moderate-to-high potential occurrence will have some adverse impact.
- Exploration activities could include core drilling or trenching to evaluate a deposit's potential.

4.2.5.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact other solid leasable mineral development include limits on leasing and surface-disturbing, timing, and surface-use restrictions. Oil shale is not considered in the alternatives due to the Programmatic EIS and Plan Amendments for Oil Shale and Tar Sands Resources Leasing on Lands Administered by the BLM in Colorado, Utah, and Wyoming currently being prepared by the BLM. To implement the decisions resulting from this Programmatic EIS, as well as the final regulations, the BLM has determined that it will be necessary to amend this RMP in areas where oil shale resources are present. Maps 14 through 16 show other solid leasable minerals, sodium, and phosphate for alternatives A through D.

Impacts Common to All Alternatives

Adverse impacts to other solid leasables could result when leasing or exploration are prohibited or when surface-disturbing restrictions apply to exploration and development activities. The intensity of impacts to other solid leasables is anticipated to vary by alternative. The greater the acreage closed or subject to surface-disturbing restrictions, the greater the adverse impact. Restrictions on timing and surface use may put some limits on activities associated with exploration and development, but these types of restrictions are not expected to prohibit activity. Oil shale leasing will not be considered in areas where it would jeopardize the safe operation of existing trona mines. Timing restrictions for bald eagle roosts will limit exploration and development activity of phosphates for more than 6 months of the year on 883 acres of federal mineral estate with moderate-to-high phosphate resource occurrence potential for all alternatives. In addition, the Raymond Mountain WSA is not available for phosphate leasing under all alternatives.

Alternative A

Federal mineral estate outside of the Raymond Mountain WSA is available for consideration for leasing of phosphate and other solid leasables on a case-by-case basis. Restrictions to protect special status plant and wildlife species and cultural resources could adversely impact development of other solid leasables on federal mineral estate if a biological survey finds such species present in the proposed development.

Alternative B

Alternative B does not allow new other solid leasable resources exploration or leasing within the viewshed of the Fossil Butte National Monument or of incorporated towns and cities (Map 15). Under Alternative B, the Bear River Divide MA and Rock Creek/Tunp MA are administratively unavailable for new solid leasable minerals and areas with special status plant and wildlife species are closed to other solid leasable resources development. Additional detail regarding restrictions associated with the Bear River Divide MA and Rock Creek/Tunp MA are described in the Special Designations section. Based on size of the area not available for leasing and size of the area subject to surface-disturbing restrictions, Alternative B has the greatest potential for adverse impact to the development of phosphate resources of all the alternatives.

Alternative C

Alternative C management actions for other solid leasables are the same as Alternative A and, therefore, are expected to have similar adverse and beneficial impacts to the development of phosphate resources (Map 14).

Alternative D (Proposed RMP)

Alternative D management actions for other solid leasables are similar to those under Alternative A with the addition of allowing no new phosphate exploration and leasing in the Rock Creek/Tunp and Bear River Divide MAs (Map 16). Restrictions on leasing and surface-disturbing activities associated with the Bear River Divide MA and Rock Creek/Tunp MA are expected to adversely impact leasing and development of phosphate more under Alternative D compared to Alternative A. Additional detail regarding restrictions associated with the Bear River Divide MA and Rock Creek/Tunp MA are described in the Special Designations section.

4.2.5.3 Conclusion

Management actions to protect resource values may impact the acreage open to leasing, exploration, and development of other solid leasables and (or) limit how these activities can be conducted. The potential occurrence of moderate-to-high phosphate federal mineral estate is impacted by closures or surface-disturbing restrictions under all alternatives, but the restricted area is largest under Alternative B. Alternative B restrictions on phosphate development activity are intended to protect floodplains, ACECs, the Rock Creek/Tunp MA, and the Fossil Basin viewshed, along with other sensitive areas. Alternative D has fewer restrictions on other solid leasables than Alternative B and, therefore, less impact. Alternatives A and C have the fewest restrictions and the least impact on other solid leasables.

4.2.6 Salable

Actions that could occur through implementing an alternative may affect access to salable minerals. Other types of actions may place or remove restrictions or additional requirements on exploration and development activities. An example of an additional restriction is a viewshed restriction on development activity that, while not preventing access, requires that development activity be conducted so that it is not readily apparent.

4.2.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The potential for occurrence of mineral materials exists across the planning area.
- The potential for mineral resources is a prediction of the likelihood of the occurrence of these resources. The occurrence of a mineral resource does not necessarily imply that the mineral can be economically exploited or is likely to be developed; mineral occurrence potential includes both exploitable and potentially exploitable occurrences. The potential for the occurrence of a mineral resource also does not imply that the quality and quantity of the resource are known (BLM 2004a).
- The potential for salable limestone development activity is very low for the planning period. Substantial commercial limestone production in the planning area is not expected.
- Additional common variety materials, such as sand, gravel, decorative stone, clay, shale, borrow material, and clinker (scoria), occur within the planning area, but their aerial extents are not mapped in GIS format. Some varieties (e.g., aggregate sand and gravel, borrow material) have a high potential for development. Current production and demand for building stone and moss rock is expected to continue. However, this is dependent on the growth rate in the building industry as well as other economic factors.
- Any alternative that limits mineral material development (i.e., reduces the area available for development) will have some adverse impact.

- Exploration activities could include core drilling or trenching to evaluate a deposit.
- Building stone can be either locatable or salable. In some cases, this determination requires the completion of a mineral examination report by BLM. If it is a common variety and not subject to the mining law, then it is salable.
- Area closures and surface and timing restrictions could result in adverse impacts by reducing access to common variety materials.

4.2.6.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact salable mineral development include management actions resulting in areas closed to mineral material disposal, surface-disturbing restrictions that effectively close areas to mineral material disposal, and timing and surface use restrictions.

Impacts Common to All Alternatives

Restrictions on salable mineral development could result in substantial adverse impacts to exploration and development activities when closures and surface-disturbing restrictions apply. The intensity of impacts is anticipated to vary by alternative. The greater the acreage closed or not allowing surface-disturbing activities, the greater the adverse impact to this resource. Therefore, impacts from closures and surface-disturbing restrictions are described under the individual alternatives. Restrictions linked to timing and surface use may add additional limits (mainly by increasing costs) on the ability of industry to develop these types of high-volume cost-sensitive types of resources.

Alternative A

No closure to mineral material disposal or surface-disturbing restrictions apply to federal mineral estate with potential salable resources under this alternative. Mineral material sales and (or) free use permits will be authorized in areas with special status plant and wildlife species on a case-by-case basis.

Alternative B

New mineral material sales and free use permits will not be issued on approximately 970,953 acres of federal mineral estate under Alternative B, the largest restriction of any alternative (see Map 17). Areas of federal mineral estate that will not be available for mineral material sales or free use permits, which could effectively close those areas to mineral material disposal, include the Raymond Mountain WSA (32,880 acres), a buffer of a ½-mile radius of developed campgrounds (726 acres), the viewshed of Fossil Butte National Monument (250,146 acres), and in areas containing special status plant and wildlife species (refer to Map 17). Surface-disturbing and overlapping timing restrictions could result in adverse impacts (by reducing access) to the common variety materials listed above in the Methods and Assumptions section. To protect resource values, Alternative B prohibits new mineral material disposals on the largest area, thereby causing the greatest adverse impacts on salable minerals compared to all alternatives.

Alternative C

Alternative C management actions for salable minerals are the same as Alternative A. Impacts to salable minerals are, therefore, anticipated to be similar compared to Alternative A.

Alternative D (Proposed RMP)

New mineral material disposals will not be issued on approximately 34,374 acres of federal mineral estate under Alternative D, more than Alternative, A but less than Alternative B (see Map 18). These include no mineral material sales and (or) free use permits authorized within the Raymond Mountain WSA or within ½ mile of developed campgrounds; however, if impacts to campground users are minimized, salable

minerals could be developed. Alternative D also restricts mineral material disposals in actual special status plant species locations. Due to the greater area, restrictions on mineral material disposals under Alternative D may adversely impact (by reducing access) development of salable minerals more compared to Alternative A.

4.2.6.3 Conclusion

Management actions may adversely impact the acreage available for mineral material sales and (or) free use permits. In addition, management actions may restrict how and when exploration and development activities can be conducted. Based on the acreage prohibiting new mineral material sales and (or) free use permits, and restrictions identified to protect resource values, Alternative B will have the greatest adverse impact to salable minerals, followed by Alternative D. Due to the general lack of restrictions, impacts to mineral material sales and free use permits are similar and the least adverse for salable mineral development under alternatives A and C.

With respect to the common variety materials listed in the Methods and Assumptions section, it should be noted that the location of these potential areas are not mapped for this analysis. Therefore, predicting potential adverse impacts due to restrictions identified under each alternative are presented only in a general way.

4.3 Fire and Fuels Management

The impacts of alternatives on fire and fuels management are anticipated to affect the planning, management, implementation, and cost of fire management. Restrictions on fire and fuels management are considered direct impacts. Indirect impacts from alternatives include actions resulting in a change in risk or incidence of wildland fires; size, intensity, or destructive nature of wildland fires; fire-suppression costs; and fuel loading.

Fire plays an important and natural part in ecosystem function; however, the natural fire regime largely has been altered in the planning area. Although the alteration of the natural fire regime is considered an adverse impact to fire ecology, actions contributing to an increase in the incidence of wildland fires or limiting the ability to effectively fight wildland fires are considered adverse impacts to fire management. This analysis focuses on impacts to fire management. For example, actions limiting fire-suppression tactics, thereby resulting in larger burn areas or more intense fires, are considered adverse impacts. Conversely, actions contributing to a decrease in the incidence of resource-damaging wildland fires or enhancing the ability to fight fires are considered beneficial impacts. For example, the use of unlimited tactics or full suppression may, in some cases, protect a resource against potential fire damage, a beneficial impact. Regarding planned or prescribed fire, actions restricting the acreage or effectiveness of prescribed fire are considered adverse. For example, stipulations to protect other resources (e.g., wildlife or livestock grazing) restricting or preventing prescribed fires from being conducted in certain areas or at certain times of the year are considered direct adverse impacts to prescribed fire management. Conversely, the lack of stipulations or actions increasing the acreage or effectiveness of prescribed fire are considered a beneficial impact.

For the purpose of this analysis, short-term impacts to fire and fuels management include impacts occurring within 5 years. Long-term impacts are those remaining or occurring after 5 years. Impacts to fire and fuels management from alternatives are anticipated to be short-and long-term.

The following description of impacts is organized according to three sections: unplanned/wildland fire, planned/prescribed fire, and stabilization and rehabilitation following fire. The methods and assumptions and analysis of alternatives sections are described only under the first section, Unplanned/Wildland Fire, but apply to all three sections. Refer to Map 20 for Fire and Fuels Management.

4.3.1 Unplanned/Wildland Fire

4.3.1.1 Methods and Assumptions

Alternatives are evaluated based on a regional context of high fuel loadings and current management issues for all resource programs, as described in Chapter 3.

Methods and assumptions used in this impact analysis include the following:

- Wildland fire in Wildland Urban Interface (WUI) areas typically will be suppressed.
- Under all alternatives, threatened and endangered species consultation and coordination will be conducted, where applicable, regardless of alternative.
- The Appropriate Management Response (AMR), which may include wildland fire use, will be used in areas where wildland fires do not pose a threat to human life, private property, or important resources and could be used as a tool to reduce fuel loads and improve plant communities and certain desirable wildlife habitats.
- The *Fire Management Plan Southwestern Zone Wyoming BLM 2004* will implement the fire management direction on BLM land within the planning area (BLM 2004f).

- Air quality currently is not affecting the ability to conduct prescribed burns; however, the more stringent air quality standards are, the more likely it is that they will affect that ability in the long term, with development occurring elsewhere in the region.
- Where livestock grazing occurs, it is BLM policy that areas burned must be deferred from grazing for a minimum of two consecutive growing seasons after the fire is extinguished.
- The BLM Emergency Stabilization and Rehabilitation standards located in the DOI *Interagency Burned Area Emergency Response Guidebook* (USDI 2006) and the *BLM Burned Area Emergency Stabilization and Rehabilitation Handbook* (2007c) could be implemented on wildland fires to protect and sustain healthy ecosystems and protect life and property.
- The BLM will cooperate with the State of Wyoming Abandoned Mine Land Division to control fires in coalbeds.

4.3.1.2 Analysis of Alternatives

Allowable uses and management actions that could impact fire and fuels management generally can be characterized as either restrictions or proactive management actions associated with each alternative. The following analysis of alternatives describes potential impacts from alternatives according to three sections: wildland fire, prescribed fire, and stabilization and rehabilitation.

As fire and fuels management is affected by the alternatives, fire and fuels management can, in turn, impact other resources, including resource protection. For example, fires burning greater acreage for longer periods will emit more particulate matter into the air, thereby affecting air quality. In addition, fire can affect rangeland health, wildlife habitat quality and quantity, and plant community health. The impacts of fire and fuels management on other resource topics (e.g., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types and context of impacts anticipated for wildland fire because of the various alternatives are similar. Impacts to wildland fire from restrictions and proactive management actions, therefore, are described under individual alternatives.

Alternative A

Management actions regarding fire suppression are currently guided by decisions in the existing plan (BLM 1986a) and the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). Wildland fire suppression follows AMR. Under Alternative A, fire suppression is driven by property threatened or resource benefits derived. Full suppression is used where it is clearly warranted due to potential resource damage, threats to persons or property, or adverse weather conditions or forecast (BLM 1986a).

Restrictions. Alternatives restricting fire suppression, fuels management, or wildland fire planning are anticipated to adversely impact wildland fire management. For example, except to protect human life, Alternative A does not allow use of fire-suppression chemicals in special status plant species populations or within 200 feet of water sources. Soil disturbance from use of heavy equipment is allowed during fire suppression in the planning areas; however, soil disturbance is limited to protect cultural and natural resources. These restrictions under Alternative A limit, and therefore adversely impact, fire suppression and fire management.

Proactive Management Actions. Alternative A allows wildland fire use to meet fire and fuels resource management objectives and to reduce hazardous fuels, which are beneficial impacts to this resource.

Suppression of wildland fire follows AMR in areas where fire is not desired or where fire can be used as a management tool. Prescribed fire and wildland fire use can be used to reintroduce fire in its natural role in the ecosystem, a beneficial impact to this resource.

Alternative A manages wildland fire in accordance with a limited number of restrictions and specific proactive management actions. The restrictions in Alternative A are anticipated to have short- and long-term adverse impacts to wildland fire management. For example, use of wildland fire to reduce hazardous fuel loads will facilitate fire containment and suppression. Conversely, restrictions on suppression activities could maintain or increase hazardous fuel loads.

Alternative B

Restrictions. Although Alternative B continues to use AMR strategies in areas where fire is not desired or where fire can be used as a management tool, the increase in restrictions on suppression activities adversely impacts fire management to a greater extent compared to Alternative A. For example, Alternative B does not allow soil disturbance during suppression activities without consent of the authorized officer, thereby adversely impacting fire suppression more than Alternative A. In addition, Alternative B enlarges the restrictions on the use of fire-suppression chemicals in areas of special status plant species populations to ¼ mile and to 500 feet from surface water sources.

Proactive Management Actions. Similar to Alternative A, Alternative B allows wildland fire use to meet fire and fuels resource management objectives; however, these management objectives are based on the thresholds and areas identified in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), thereby benefiting fire management in the planning area. In addition, allowance of wildland fire to meet vegetation objectives throughout the planning area and to simulate natural alteration of vegetation to meet wilderness and healthy forest objectives in the Raymond Mountain WSA, are anticipated to benefit the fire management program more compared to Alternative A.

Although fire suppression under Alternative B is more restrictive compared to Alternative A, Alternative B's proactive management actions for using wildland fire to achieve management objectives are anticipated to result in beneficial impacts to wildland fire management throughout the planning area. The combination of more restrictions and beneficial actions for Alternative B are anticipated to have more overall benefits to wildland fire management relative to Alternative A.

Alternative C

Restrictions. Alternative C has fewer fire-suppression and heavy-equipment restrictions than Alternative A, potentially benefiting fire management through increased management flexibility. For example, Alternative C does not allow soil disturbance throughout the planning area unless private or public habitable structures or industrial facilities are at risk. However, Alternative C also requires suppression of all wildland fires in the planning area, thereby restricting the BLM's ability to meet objectives in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) and increasing hazardous fuel loads in the planning area.

Proactive Management Actions. Under Alternative C, use of fire-suppression chemicals is allowed throughout the planning area (including near surface water sources), except in special status plant species populations. The flexibility to use fire-suppression chemicals throughout the planning area is anticipated to benefit fire management more than in Alternative A.

Unlike alternatives A and B, Alternative C does not use wildland fire, chemical, mechanical, or biological treatments to meet fire and fuels objectives, thereby adversely limiting fire management flexibility and potentially increasing hazardous fuel loads in the planning area. In addition, Alternative C does not allow

wildland fire use to reintroduce fire to its natural role in the ecosystem. Use of wildland fire in the Raymond Mountain WSA is similar to Alternative B.

Suppression of all wildland fires and not considering fire to reduce hazardous fuel loads and reintroduce fire to its natural role in the ecosystem does not allow the BLM to meet the fire and fuels management objectives in the *Fire Management Plan* Southwestern *Zone Wyoming BLM 2004* (BLM 2004f). The combination of restrictions and proactive management actions of Alternative C are anticipated to have less overall benefits to wildland fire management relative to Alternative A, potentially resulting in the greatest adverse impacts to fire management of all alternatives.

Alternative D (Proposed RMP)

Restrictions. Similar to Alternative A, Alternative D restricts use of fire-suppression chemicals near surface water sources and special status plant species populations; however, this restriction under Alternative D includes a 200-foot buffer around these plant populations. Restrictions on soil disturbance during suppression activities are similar to Alternative B. Under Alternative D, wildland fires generally are suppressed in areas of high-density urban and industrial interface with intermingled BLM-administered lands.

Proactive Management Actions. In areas of low-density urban and industrial interface where BLM-administered lands occur in large blocks, wildland fires can be used to achieve resource objectives. Under AMR Alternative D allows wildland fire use to meet fire and fuels management objectives similar to Alternative B. Similar to alternatives B and C, Alternative D also allows wildland fire use in the Raymond Mountain WSA.

Alternative D places greater restrictions on wildland fire management than Alternative A; however, Alternative D uses wildland fire to meet management objectives, potentially reducing hazardous fuel loads. Overall, Alternative D is anticipated to have less of an adverse impact to wildland fire management relative to Alternative A.

4.3.1.3 Conclusion

The allowable uses and management actions for resources and resource uses are anticipated to result in a mix of beneficial and adverse impacts relative to wildland fire management. Based on a balance of restrictions and proactive management actions, Alternative D could have the least adverse impact to wildland fire management. Although Alternative C has the least restrictions, the unrestricted full suppression tactics could result in a long-term adverse impact by contributing toward maintaining high fuel loads and a continuing high risk of wildland fires. Alternative B places the most restrictions on wildland fire suppression of any alternative and, therefore, has the most potential for adversely impacting wildland fire-suppression activities. Conversely, while alternatives B and D have the most restrictions, these restrictions could indirectly benefit fire management in the long-term because greater reliance on limited tactics likely would result in a higher acreage of land burned during wildland fires, thus contributing toward a reduction of fuel loads in the planning area. Overall, alternatives B and D are anticipated to have similar and more beneficial impacts to wildland fire management relative to Alternative A.

4.3.2 Planned/Prescribed Fire

Prescribed fire can be used to achieve measurable landscape-level or site-specific level objectives, such as reducing hazardous fuel loads, creating diversity within vegetative communities, enhancing livestock management, improving certain desirable wildlife habitats, regenerating decadent vegetative communities, and improving watershed health. Most of the prescribed fires in the planning area will occur in mountain shrub and aspen communities. Stipulations from other resources allowing or preventing prescribed fires to be conducted in certain areas or at certain times of the year are direct impacts to prescribed fire management.

4.3.2.1 Methods and Assumptions

Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife, certain desirable wildlife habitats, and vegetative communities. Prescribed fire also can have a long-term beneficial impact to other resources and resource uses in the planning area by reducing fuel loads and reducing the risk of catastrophic wildland fire.

Methods and assumptions used in this impact analysis include the following:

- Under all alternatives, threatened and endangered species consultation and coordination will be conducted, where applicable, regardless of alternative.
- Appropriate Management Response (AMR) will be used.
- The *Fire Management Plan Southwestern Zone Wyoming BLM 2004* will implement the fire management direction on BLM land within the planning area (BLM 2004f).
- Air quality currently is not affecting the ability to conduct prescribed burns; however, the more stringent air quality standards are, the more likely it is that they will affect that ability in the long term, with development occurring elsewhere in the region.
- Where livestock grazing occurs, it is BLM policy that areas burned must be deferred from grazing for a minimum of two consecutive growing seasons after the fire is extinguished.

4.3.2.2 Analysis of Alternatives

Refer to the Analysis of Alternatives section for Unplanned/Wildland Fire.

Impacts Common to all Alternatives

The short- and long-term impacts from prescribed fire will benefit fire and fuels management and other resources; however, by removing existing vegetation and exposing soil, fire does provide an opportunity for the establishment of INNS and the potential for soil erosion. Smoke from fire temporarily degrades local air quality; however, all prescribed fire activities will comply with state and federal air quality standards. Weather, fuels, topography and other factors can cause prescribed fire to escape, becoming a wildland fire.

Where livestock grazing occurs, it is BLM policy that prescribed burn areas are rested from grazing a minimum of two consecutive growing seasons, based on management objectives consistent with *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management* (BLM 1998a). BLM will use environmental and rangeland conditions to identify whether the two season period has provided enough recovery time. Land ownership patterns in the planning area can impede the ability to conduct prescribed burns. Prescribed burns generally are not possible where domestic livestock producers are unable to absorb the cost of the deferral period, as required by BLM policy. This policy may impact prescribed fire management because

it restricts the ability to use prescribed fire as a management tool. Conflicting resource demands also can adversely impact prescribed fire management.

Alternative A

Approximately 40,000 acres of short-term disturbance are anticipated from prescribed fire under Alternative A. All but 400 acres of this disturbance is reclaimed (Appendix M).

Restrictions. No specific areas are identified as excluded from prescribed fire under Alternative A. Prescribed fire is used to manipulate vegetation on areas identified for treatment in the range, forestry, and wildlife programs.

Proactive Management Actions. Prescribed fire is used to meet fire and fuels resource management objectives, reduce hazardous fuels, reintroduce fire in its natural role to the ecosystem, and improve plant community health.

Alternative B

Similar to Alternative A, approximately 40,000 acres of short-term disturbance will occur from prescribed fire under Alternative B (Appendix M). All but 400 acres of this disturbance are reclaimed.

Restrictions. Under Alternative B, the following areas are excluded from prescribed fires: Bridger Butte ACEC, Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and the Bear River Divide trail landmark. The exclusion of these areas from treatment may increase hazardous fuels and the risk of catastrophic fire in these areas.

Proactive Management Actions. Similar to Alternative A, Alternative B uses prescribed fire to achieve fire and fuels resource management objectives, reduce hazardous fuel loads, and reintroduce fire in its natural role back into the ecosystem. This approach could result in a beneficial impact to fire management in the planning area. In addition, use of prescribed fire could have beneficial impacts in the Raymond Mountain WSA, including better simulation of natural regeneration of vegetation.

Alternative C

Under Alternative C, no short- or long-term disturbance is anticipated by BLM actions from prescribed fire.

Restrictions. While use of prescribed fire is allowed under Alternative C, no specific requirements or restrictions on use of prescribed fire are identified for this alternative.

Proactive Management Actions. Under Alternative C, prescribed fire is not considered to achieve fire and fuels resource management objectives, reduce hazardous fuel loads, and reintroduce fire in its natural role back into the ecosystem. Without treatments, the fire and fuels management objectives in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) will not be met, an adverse impact to this resource.

Alternative D (Proposed RMP)

Similar to alternatives A and B, approximately 40,000 acres of short-term disturbance will occur from prescribed fire under Alternative D (Appendix M). All but 400 acres of this disturbance are reclaimed.

Restrictions. The Bridger Butte ACEC is excluded from prescribed burns under Alternative D.

Proactive Management Actions. Similar to Alternative B, Alternative D uses prescribed fire to meet fire and fuels resource management objectives and reestablish fire in its natural role in the ecosystem. Similar to alternatives A and B, prescribed fire could be used to reduce hazardous fuels under Alternative D. This approach could result in a beneficial impact to fire management in the planning area. Alternative D allows the use of prescribed fire in the following areas to protect or enhance the sites: Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and the Bear River Divide trail landmark. The fewer the exclusions to the use of prescribed fire, the greater the benefit to the fire management program and the greater the potential to meet fire and fuels objectives in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f).

4.3.2.3 Conclusion

Using prescribed fire to achieve measurable objectives for other resource programs and to manage fuels are anticipated to benefit prescribed fire management. Alternative D is anticipated to result in greater beneficial impacts to prescribed fire management and more beneficial impacts compared to Alternative A. Alternative C has the least beneficial impact because by not considering the use of prescribed fire in achieving resource objectives, the fire management program is unlikely to meet fire and fuels management goals. Alternative B imposes greater restrictions on prescribed fire use than Alternative A, resulting in fewer beneficial impacts compared to Alternative A.

4.3.3 Stabilization and Rehabilitation

Stabilization and rehabilitation techniques can be implemented following fires and following fire-suppression activities. The spread of cheatgrass, in particular, is possible in areas that have been burned or disturbed due to fire-suppression activities. Widespread presence of cheatgrass can alter the local fire regime and fire-recurrence interval. Impacts are measured by the ability to conduct stabilization and rehabilitation efforts and the success of these efforts. Restrictions to stabilization and rehabilitation are considered a direct adverse impact. Indirect impacts could occur where stabilization and rehabilitation introduce a long-term risk of recurrent fire, requiring new stabilization and rehabilitation efforts. According to the DOI *Interagency Burned Area Emergency Response Guidebook* (USDI 2006) and the *BLM Burned Area Emergency Stabilization and Rehabilitation Handbook* (BLM 2007c), which could be implemented on wildland fires under all alternatives, emergency stabilization and (or) rehabilitation actions will promote the reestablishment of healthy native plant communities, protect and sustain ecosystems, and will be evaluated on a site-by-site basis following wildland fires.

4.3.3.1 Methods and Assumptions

The Instruction Memorandum (IM) 2006-073, Weed-Free Seed Use on Lands Administered by the BLM, applies to all alternatives. Specifically, IM 2006-073 states: "All Field Offices are required to use seed on public lands that contain no noxious weed seed and meets certified seed quality. All seed to be applied on public land must have a valid seed test, within one year of the acceptance date, from a seed analysis lab by a registered seed analyst (Association of Official Seed Analysts) (BLM 2006c)." Refer to the Methods and Assumptions section for Unplanned/Wildland Fire for additional methods and assumptions.

4.3.3.2 Analysis of Alternatives

Refer to the Analysis of Alternatives section for Unplanned/Wildland Fire.

Impacts Common to all Alternatives

The types and context of impacts anticipated for stabilization and rehabilitation because of the various alternatives are similar. Impacts to stabilization and rehabilitation from restrictions and proactive management actions, therefore, are described under individual alternatives.

Alternative A

Alternative A does not require the use of certified weed-free mulch for stabilization and rehabilitation projects. Stabilization and rehabilitation success could be limited and the potential exists for the introduction of INNS.

Alternative B

Requiring the use of certified weed-free mulch in stabilization and rehabilitation projects will result in greater beneficial impacts compared to Alternative A.

Alternative C

Under Alternative C, the use of certified weed-free mulch in stabilization and rehabilitation projects is recommended, but not required, resulting in similar adverse impacts compared to Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the use of certified weed-free mulch in stabilization and rehabilitation projects is required and anticipated to result in greater beneficial impacts compared to Alternative A.

4.3.3.3 Conclusion

Alternatives B and D are anticipated to have similar and greater beneficial impacts to stabilization and rehabilitation efforts compared to Alternative A. The requirement for using certified weed-free mulch in stabilization and rehabilitation projects is anticipated to reduce the spread of INNS in the planning area because of fire. Alternatives A and C are anticipated to have similar and less beneficial impacts due to the lack of a requirement for the use of certified weed-free mulch in stabilization and rehabilitation projects.

4.4 Biological Resources

This section describes compliance with the Endangered Species Act (ESA) for special status species, as well as the anticipated environmental consequences (i.e., impacts) each alternative could have on habitat fragmentation and biological diversity. The potential environmental consequences to individual biological resources (i.e., vegetation, fish, wildlife, and special status species) are described following the Habitat Fragmentation and Biological Diversity section, below.

Special Status Species

Section 7 of the ESA requires federal agencies (such as BLM) to address impacts on species listed under the ESA through consultation with the USFWS. Informal conferencing and consultation with the USFWS occurs for authorized federal activities that potentially affect habitats for endangered, threatened, proposed, and candidate species within the planning area (USFWS 2004). As part of informal consultation, the BLM's Kemmerer Field Office receives an annual list of species listed or proposed for listing as threatened or endangered.

Kemmerer's Biological Assessment (BA) analyzes the potential affects of the Proposed RMP on those species listed as threatened or endangered and occurring in the planning area (BLM 2007b). Habitat conservation measures identified in the BA are applied to surface-disturbing and disruptive activities, as appropriate, to protect species listed as threatened or endangered. In addition, surveys for threatened and endangered species on federal land or on split-estate land are conducted in potential habitats prior to approval of projects or activities that could impact these species. Conservation measures and terms and conditions identified in Statewide Programmatic BAs and Biological Opinions (BOs) for listed plant and wildlife species within the planning area also will be implemented (see Appendix A).

Habitat Fragmentation and Biological Diversity

Habitat fragmentation and biological diversity are not resources or resource uses; rather, they are conditions within the planning area that can be impacted by BLM management actions and allowable uses as expressed in the alternatives (see Chapter 2). As such, habitat fragmentation and biological diversity are described immediately following this introduction and prior to the descriptions of anticipated impacts to individual biological resources. Habitat fragmentation is anticipated to continue and incrementally increase in the future commensurate with surface-disturbing activities and associated development. The Secretary of the Interior has the authority and responsibility to protect the environment and allow for the development of resources on federal lands.

The United States Court of Appeals for the D.C. Circuit in Sierra Club v. Peterson, 717 F.2d. 1409 (D.C. Cir. 1983) found that "on land leased without an NSO stipulation, the DOI [U.S. Department of the Interior] cannot deny the permit to drill…once the land is leased the DOI no longer has the authority to preclude surface-disturbing activities even if the environmental impact of such activity is significant. The Department can only impose mitigation upon a lessee who pursues surface-disturbing exploration and/or drilling activities." The court goes on to say "notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the DOI has made an irrevocable commitment to allow some surface-disturbing activities, including drilling and road building." For these reasons and to minimize habitat fragmentation, large blocks of contiguous habitats with low oil and gas development potential are administratively unavailable for oil and gas leasing in alternatives B and D.

The extent or intensity of fragmentation is expected to vary by alternative. The extent of fragmentation under each alternative is primarily anticipated to be a function of the amount of long-term surface disturbance in the planning area and proactive management actions anticipated to minimize fragmentation.

Management challenges regarding habitat fragmentation and future management of the planning area include balancing the requirement for multiple use and sustained yield with management of a diversity of resources and resource uses that sometimes conflict. These challenges are complicated by the intermingled public and private ownership pattern that exists within the planning area in the checkerboard found in the southern part of the planning area. On the other hand, relatively large blocks of contiguous habitat are north of the checkerboard in Lincoln County. Future challenges regarding habitat fragmentation include managing the location and constructing, maintaining, and operating infrastructure required for mineral, energy, transportation, and other development, all while adhering to habitat requirements of wildlife and special status species occurring in the planning area. Additional management challenges in the planning area include controlling the spread of INNS, managing fire suppression and stabilization and rehabilitation activities, and integrating activities of resources affecting habitat fragmentation. Management actions anticipated to address the challenges of habitat fragmentation are included as part of the alternatives (primarily vegetation) described in Chapter 2.

Under all alternatives and for the life of the plan, biological diversity is anticipated to remain within the range of conditions bounded by the current situation; however, the rate of change in biological diversity is anticipated to vary by alternative. Allowable uses and management actions primarily anticipated to impact biological diversity are described below under the topics of surface-disturbing activities, proactive management actions, fire and fuels management, and INNS.

Actions affecting biological diversity include BLM-authorized actions within the planning area, as well as external actions beyond the control of the BLM. External factors influencing biological diversity include changes to the natural fire regime, urbanization (e.g., WUI), agricultural conversion of rangelands, INNS, and energy development on private lands in the checkerboard. Maintaining the diversity and distribution of habitats within the planning area is complicated by existing conditions of land ownership, lack of a natural fire regime, conflicting land use, INNS, WUI, and habitat fragmentation. The impacts of potential habitat changes on wildlife and special status species are discussed under Fish and Wildlife Resources and Special Status Species elsewhere in this chapter.

Surface-disturbing Activities. Surface-disturbing activities on BLM-administered land vary with the alternatives. Under alternatives A and C, surface-disturbing activities are managed to comply with current standard practices and the Wyoming BLM Mitigation Guidelines. In addition, oil and gas-related activities are restricted on slopes greater than 25 percent and NSO for fluid minerals on slopes greater than 40 percent. Alternative B prohibits surface-disturbing activities on highly erosive and sensitive soils and slopes of 10 percent or greater unless or until the permittee or designated agent and surface management agency arrive at an acceptable plan for mitigation of anticipated impacts, while Alternative D avoids surface disturbance on slopes of 20 percent or greater. Under all alternatives, BMPs are applied to minimize impacts of surface-disturbing activities, whether they are on highly erosive soils or not. As shown in Table 4-1, projected long-term surface disturbance is lowest for Alternative B, followed by Alternative D. Projected long-term surface disturbance for alternatives A and C is approximately double that of Alternative D. The actions proposed under alternatives B and D to address fragmentation of habitats indirectly reduce the amount of surface disturbance occurring in contiguous blocks of native vegetation in the planning area.

In general, surface-disturbing activities are anticipated to result in long-term loss, degradation, and fragmentation of habitats, thereby impacting biological diversity of the planning area. Construction of well pads and roads, pits and reservoirs, wind energy farms, and pipelines and powerlines; mining; and vegetation treatments are the kinds of surface-disturbing activities anticipated in the planning area. Surface disturbance associated with permanent linear infrastructure (roads) is anticipated to have the greatest adverse impact on habitat fragmentation. Alternative B is expected to have the fewest miles of linear features of all alternatives (Appendix M).

Proactive Management Actions. Table 2-3 describes proposed management actions (see Vegetation) for addressing habitat fragmentation in accordance with the different alternatives. Current management does not specifically address habitat fragmentation; likewise, management actions to address habitat fragmentation are not proposed for Alternative C. Alternatives B and D propose to address the challenge of habitat fragmentation by managing large, contiguous blocks of federal land by maintaining or enhancing sagebrush, aspen, and mountain shrub communities. Alternatives B and D maintain connections between these community types and ensure construction disturbance is minimized to the smallest acreage possible, while still considering engineering feasibility and safety, resulting in greater beneficial impacts to habitat fragmentation than Alternative A. Habitat conservation objectives include no greater than 12.5 percent net loss of crucial habitat acres in the planning area over the life of the plan. The 12.5 percent value was provided by the WGFD as a threshold for disturbance, above which the habitat function of the lands involved is substantially impaired and cannot generally be recovered through management or habitat treatments.

Fire and Fuels Management. Wildland fire and prescribed fire could impact biological diversity and are anticipated to result in similar adverse short-term impacts to habitats; however, the long-term benefits of fire, especially prescribed fire, generally are anticipated to improve the quality of habitat types and contribute to the maintenance of biological diversity. The lack of a natural fire regime is the primary fire ecology factor impacting biological diversity. Over time, lack of a natural fire regime is anticipated to reduce biological diversity in the planning area. Current management does not specifically address lack of a natural fire regime; however, it does utilize prescribed fire to manipulate vegetation to achieve resource objectives. Alternatives B and D propose to utilize prescribed fire to achieve measurable objectives for resource management, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems within the planning area, resulting in greater beneficial impacts to biological diversity than Alternative A. Alternative C suppresses all wildland fires and does not utilize prescribed fire to achieve measurable objectives for resource management, reduce hazardous fuels, and reintroduce fire into fire-adapted ecosystems within the planning area.

INNS. To various degrees, INNS are anticipated to continue to spread within the planning area under all alternatives. This spread is anticipated to contribute to the loss, degradation, and fragmentation of habitats, as well as to the reduction of biological diversity over time.

Conclusion. The conditions of habitat fragmentation and biological diversity are anticipated to be impacted by current management and by management actions proposed as part of the Action Alternatives. Overall, habitat fragmentation is anticipated to have adverse impacts on biological diversity and biological resources. The primary factors impacting habitat fragmentation in the planning area are surface-disturbing activities that break blocks of habitat into smaller units and proactive actions to avoid or minimize fragmentation. The primary factors impacting biological diversity in the planning area are surface disturbance, fire and fuels management, INNS, and habitat fragmentation. Considering these factors, Alternative B is anticipated to contribute the least to habitat fragmentation and have the least adverse impact to biological diversity. For the same reasons, alternatives A and C are anticipated to contribute the most to habitat fragmentation and have the greatest adverse impact to biological diversity. Alternative D is anticipated to result in less habitat fragmentation than alternatives A and C, but more than Alternative B.

4.4.1 Vegetation – Forests, Woodlands, and Forest Products

Actions occurring through implementing each alternative could affect forests, woodlands, and forest products. This section describes the potential impacts each alternative may have on forests, woodlands, and forest products in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are described as beneficial or adverse with respect to forests, woodlands, and forest products. Refer to Map 21 for vegetation.

Actions restricting forest management practices or contributing to the decline in abundance, distribution, or health of forests, woodlands, and the availability, quality, and quantity of forest products are considered adverse impacts. Indirect impacts include any change in the forest and woodland species, vigor, health, site quality, and vegetative community type because of natural forces (e.g., insect and disease, fire, and drought conditions), management actions from other resources, or failure to implement management actions. Conversely, beneficial impacts include actions that enhance management, improve health, and protect and restore forests and woodlands in the planning area. For the purpose of this analysis, a short-term impact is one that is apparent within 5 years. A long-term impact is one that persists for more than 5 years.

Both natural and human activities could produce beneficial or adverse impacts to forest and woodland communities. Natural regeneration is an example of this. In an old growth forest, natural regeneration restores genetic diversity, sustained yield, and an uneven-aged stand to benefit continuous production, insect and disease control, and produce economic benefits by proper land utilization, soil and water conservation, and eliminating the cost of planting. Alternatively, natural regeneration can introduce conifers into aspen stands, thereby reducing the size of or out-competing the aspen stand.

4.4.1.1 Methods and Assumptions

Methods and assumptions used in this analysis include the following:

- Forest and woodland management treatments promote forest and woodland preservation, production, health, and value.
- Silvicultural treatments are considered long-term impacts.
- Livestock grazing in forests and woodlands could adversely impact the forest resource by limiting regeneration and, to a lesser degree, by compacting soils due to high concentrations. While grazing (by wildlife and livestock) can and does benefit plants and plant communities it is the time dimension of that grazing that is the causal factor relating to the limiting of plant regeneration.
- The forest generally is getting older in the planning area.
- Aspens generally are declining due to advancement of ecological conditions and succession. The advancement of ecological conditions also leads to encroachment of evergreen species into aspen stands; for example, shade-tolerant conifers invade and eventually shade out aspen stands, contributing to their decline.
- The structure and stocking of the forest is different from historic conditions; more trees and higher stocking rates exist today compared to historical conditions. The historical condition is the baseline toward which alternatives are striving to achieve. Those alternatives that will better achieve historical conditions are better for the forest resource.
- More ground fuels and ladder-type fuels exist today compared to the past.
- Insect and disease mortality is higher today than it was in the past. Probable annual harvest levels under each alternative are based on live growing stock trees. Trees killed by the mountain pine beetle deplete the live growing stock inventory of trees. Accelerated salvage harvesting of the dead trees is anticipated in the short term (years 1 thru 7). Probable annual harvest levels and acreages disturbed in the years to follow (years 8 thru 20) are anticipated to decrease.

- Forests and woodlands are important for the watershed, visual resources, and wildlife habitats. Some of these values are natural, some are sociological. For example, wildlife need habitats, not visual quality. Human, sociological, economic, and cultural influences are related to managing forestlands and must be considered.
- Management of the forest could increase the water yield from the forest.
- Water quality could be adversely impacted in the short term due to mechanical forest treatments (soil erosion, etc.), but overall, the consequences of these treatments are anticipated to be negligible.

4.4.1.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting forests, woodlands, and forest products primarily include surface-disturbing activities and proactive management actions.

As forests, woodlands, and forest products are impacted by the alternatives, forests, woodlands, and forest products can, in turn, impact other resources. The impacts of forests, woodlands, and forest products on other resource topics (i.e., physical, biological, fire and fuels management, etc.) are discussed under their respective impacted resource sections in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to forests, woodlands, and forest products because of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to forests, woodlands, and forest products from surface-disturbing activities and proactive management actions are described under individual alternatives. The following paragraphs provide a general description of potential impacts to forests, woodlands, and forest products not anticipated to differ among alternatives.

Potential air quality restrictions on vegetative treatments vary depending on air quality conditions within the immediate area at the time of proposed treatments. Potential short-term adverse impacts to vegetative treatments include planning and timing restrictions to minimize emissions associated with fugitive dust or smoke.

Direct long-term adverse impacts to forest management occur in localized areas where new cultural resource sites are discovered. While not typically found in forested areas, cultural sites could restrict location of vegetative treatments and access roads, thus decreasing the accessibility and the forest acreage available for treatments. However, it should also be noted that the size of a cultural site is only a small percentage of the total acreage involved.

Potential impacts from VRM classifications, soil and water resources, air quality, INNS, NHTs, transportation, OHV use, wildlife, and special status species are anticipated to influence the size and shape of forest and woodland treatments and restrict the location and construction of access roads. Silviculture treatments in forests and woodlands (e.g., burning for regeneration purposes) defer livestock grazing for two growing seasons to allow for regeneration (BLM 2004q).

Recreational use within forestlands could result in indirect short-term adverse impacts from accidental fires, unauthorized woodcutting within and adjacent to campgrounds, and degradation of vegetation along trails and roads. Unless properly designed and managed, developing recreational trails, both motorized and nonmotorized, could adversely impact forests and woodlands through soil erosion. Over time, increased development of nonmotorized and motorized trails and trailheads could increase recreational use and associated impacts to forestlands.

Epidemic or near epidemic levels of insect outbreaks, primarily mountain pine beetle and western balsam bark beetle, will continue for at least the next five years and will significantly change the composition, structure and function of the forested areas within the planning area.

Developing wind-energy sites is anticipated to have a localized, but direct, adverse impact on forestlands and forest management activities for all alternatives. The development of facilities and infrastructure associated with wind energy, transportation networks, minerals, reservoirs, and recreation is anticipated to increase habitat fragmentation in the planning area and remove forest acres available for management.

Short-term impacts regarding the timing or location of vegetative treatments may result from temporary surface use restrictions, seasonal restrictions, or other surface development restrictions within buffers for special status species, raptors, and bald eagle roost sites located within forests and woodlands.

The fragmentation of forests and woodlands could increase depending on the forest prescription applied; however, this impact is anticipated to be minimal because regeneration of treated areas will create forest and woodland diversity and age-class diversity. In addition, a direct long-term impact to forestlands by the disposal of forestlands in the Star Valley area is anticipated.

Alternative A

Surface-disturbing Activities. Under Alternative A, the acres of short-term surface disturbance for prescribed fire and silviculture treatments in forest and woodlands are not specified. However, the volume of timber removed from treated acres will not exceed the annual sustained yield capacity of these lands. Short-term surface disturbance is anticipated to increase the potential for short-term adverse impacts to soil erosion, water quality, and INNS; however, the relatively small size of treatment areas and the use of BMPs are expected to minimize these short-term impacts. The long-term benefits from prescribed fire and silviculture treatments will outweigh the short-term impacts by reducing fire hazards through fuel removal, increasing opportunities for natural regeneration and controlling insects and disease.

Under Alternative A, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which also would minimize impacts to forest communities. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, which could improve habitats and reduce fuel loads, resulting in a beneficial impact for forest resources.

Proactive Management Actions. Under Alternative A, approximately 19,008 acres of forestland are managed to meet public demand. Existing forestlands are perpetuated and increased as they are treated. Timber removal in the planning area will not exceed the annual sustained yield capacity; however, specific acreage requirements for managing or limiting timber management are not identified under Alternative A. Likewise, requirements for managing forestland within the Raymond Mountain WSA and old growth forest are not identified in the existing plan. Management actions are anticipated to benefit these vegetation communities by improving the overall conditions of the forests and enhancing age and species diversity.

Alternative B

Surface-disturbing Activities. Anticipated impacts under Alternative B for surface-disturbing activities are expected to be similar in nature to those described under Alternative A. Under Alternative B, approximately 50 acres of forestland ecosystem management areas and 50 acres of woodland ecosystem management areas and up to 50 acres of precommercial thinning per year are treated annually by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and composition to more historical conditions. Forest restoration would occur at a moderate level under this alternative so that the overall impacts to the associated resources would be less intrusive initially and over time. As with Alternative A, the short-term surface disturbance increases the potential for short-term adverse impacts, but the relatively small size of treatment areas and the use of BMPs minimize these short-term impacts, and the long-term benefits from prescribed fire and silviculture treatments will outweigh the short-term impacts.

Under Alternative B, soil disturbances are not allowed during fire suppression without consent from the BLM authorized officer. Similar to Alternative A, prescribed fire, as well as chemical, biological, and mechanical treatments, could be used to meet fire and fuels resource management objectives, except the objectives to be met are based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area.

Proactive Management Actions. Under Alternative B, approximately 19,008 acres of forest ecosystem management areas would be actively managed and would have an allowable probable sale quantity of 444 hundred cubic feet (CCF) (200 thousand board feet [MBF]), the least of the Action Alternatives.

Approximately 3,000 acres of combined forestlands and woodlands within the Raymond Mountain WSA are reserve managed by prescribed fire or wildland fire use to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives. No mechanical and (or) surface-disturbing activities are prescribed. No forest products are removed from this area. The forestlands within the WSA are called "reserved forest ecosystem management areas."

Approximately 15,000 acres of woodland (e.g., aspen, aspen conifer, and juniper) within the woodland ecosystem management areas are actively managed. No specified annual sale quantity is identified. Forest products are provided as a byproduct consistent with forest health, landscape restoration, and reduction of forest fuels objectives.

Under Alternative B, old growth forest areas are retained in an appropriate proportion to other timber classes, using an adaptive management approach. Old growth management areas include coniferous trees older than 150 years and aspen trees older than 100 years in association with various old growth forest characteristics. Pre-settlement old growth forest characteristics are identified for the various forest types. Connectivity of existing or potential old growth areas is adopted if appropriate and consistent with other management. Specific acreages for treatment identified under Alternative B will benefit forest and woodland resources more than Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, approximately 150 acres of forestland ecosystem management areas and 100 acres of woodland ecosystem management areas are treated annually by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and composition to more historical conditions. Anticipated impacts under Alternative C for surface-disturbing activities are expected to be similar in nature to other alternatives; however, more acres of forestland and woodland will be specified for silviculture treatment or prescribed fire than under alternatives B or D.

Under Alternative C, all wildland fires are suppressed in the planning area and no soil disturbances are allowed within the planning area from heavy equipment during fire suppression unless private or public habitable structures or industrial facilities are at risk. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment, some direct impacts are reduced. However, by not using prescribed fire, which could lead to habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts to forest communities. In addition, by suppressing all fires, Alternative C increases the potential for fuel loading and spread of INNS, thereby increasing the risk of wildland fire and insect epidemics relative to other alternatives and adversely impacting this resource.

Proactive Management Actions. Under Alternative C, approximately 19,008 acres of forestland are actively managed under forest ecosystem management areas with an annual allowable probable sale quantity of 1,333 CCF (600 MBF), the highest of all alternatives.

Approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA and 15,000 acres of woodland (aspen and juniper) under Alternative C is the same as under Alternative B.

Under Alternative C, old growth forest areas are retained at appropriate locations and distribution levels as evaluations occur using an adaptive management approach. Old growth management areas include coniferous trees older than 150 years and aspen trees older than 100 years in association with various old growth forest characteristics. Presettlement old growth forest characteristics are identified for the various forest types. Connectivity of existing or potential old growth areas is adopted whenever feasible.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, an average of 75 acres of forestland ecosystem management areas and 75 acres of woodland ecosystem management areas are treated annually by mechanical methods (partial cut or clear-cut) or prescribed fire to reduce stocking levels and structure and composition to more historical conditions. Anticipated impacts under Alternative D for surface-disturbing activities are expected to be similar in nature to other alternatives, but the acres of forestland and woodland specified for silviculture treatment or prescribed fire and associated impacts will be more than under Alternative B and less than under Alternative C.

Under Alternative D, wildland fire suppression will follow AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which includes suppression of fires to provide for human health and safety and minimizing loss of property and threats to other surface owners, such as in areas of high density urban and industrial interface with intermingled BLM-administered lands. Fire suppression also will allow achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). Soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Similar to Alternative B, prescribed fire, as well as chemical, biological, and mechanical treatments, is used to meet fire and fuels resource management objectives based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, similar to Alternative A, which could improve habitats and result in a beneficial impact for forestlands and woodlands. Under Alternative D, opportunities to utilize wildland fire to reduce fuel loads will be taken, resulting in improved forest and woodland health in fire-dependent ecosystems.

Proactive Management Actions. Approximately 19,008 acres of forestland will actively be managed in forest ecosystem management areas with an annual allowable probable sale quantity of 667 CCF (300

MBF). Approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA, 15,000 acres of woodland (aspen and juniper), and old growth forest areas is the same as under Alternative B, resulting in similar impacts to forests and woodlands.

4.4.1.3 Conclusion

The types of surface disturbance are anticipated to be similar for all alternatives, with the primary difference attributed to the acres of silviculture treatments and prescribed fire. Alternative B treats the least acreage (100 acres for forestlands and woodlands), followed by Alternative D (150 acres), and Alternative C (250 acres). Acres proposed for silviculture treatment and prescribed fire are not specified under Alternative A. The lack of any specified treatment acreage goals may increase the potential for insect and disease damage and fuel loading, thereby increasing the risk of wildland fire and insect epidemics relative to other alternatives. Therefore, it is anticipated that silviculture treatments proposed under alternatives B, C, and D would benefit forest and woodland health, including insect and disease control and fuel reduction. The greater the number of acres treated, the greater the benefit.

Under alternatives A, B, and D, allowing some wildland fires and using prescribed fire to reduce fuel loads would result in improved forest and woodland health in fire-dependent ecosystems, in contrast to Alternative C, which emphasizes the suppression of all wildland fires and no prescribed fire. Alternatives A, B, and D are similar in the use of wildland fire suppression within certain parameters, with Alternative D being most specific. Therefore, alternatives A, B, and D are anticipated to provide the greater benefit to forests, woodlands, and forest products with regard to management of wildland and prescribed fire.

For all alternatives, the same amount of land (19,008 acres) is actively managed for forest resources. However, there is a greater allowable sale quantity under Alternative C (600 MBF), followed by Alternative D (300 MBF) and Alternative B (200 MBF). No allowable sale quantity is specified under Alternative A. The greater the allowable sale quantity, the greater the benefit to forest products.

Under Alternative A, 3,000 acres within the Raymond Mountain WSA and 15,000 acres of woodlands are not managed, as proposed under alternatives B, C, and D. In addition, old growth forests are retained under alternatives B, C, and D, whereas no similar action exists under Alternative A. Management of 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA, 15,000 acres of woodlands, and retaining old growth forests is a beneficial impact to forest resources.

Restrictions to protect other resource values are anticipated to adversely impact forests, woodlands, and forest products; however, these restrictions would benefit forest resources. Several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources) under the different alternatives with the most acreage proposed under Alternative B and the least under alternatives C and A.

The following conclusion is formed from meaningful differences in surface-disturbing activities; silviculture treatments including prescribed fire; fire and fuels management actions; proactive management actions; and restrictions by other resources and resource uses: Alternative C allows for greater allowable sale quantity and acres managed per year; therefore, provides greater benefits to forest products and greater benefits to creating overall healthier forest and woodlands. Beneficial impacts for forest products, and the management of healthier forest and woodlands, are anticipated to be the least under Alternative B.

4.4.2 Vegetation – Grassland and Shrubland Communities

Actions contributing to the decline in abundance or distribution of grassland and shrubland communities are considered adverse impacts. Conversely, beneficial impacts to grassland and shrubland communities include actions that protect or restore these communities in the planning area.

Direct impacts to grassland and shrubland communities result from surface-disturbing and other activities that cause vegetation removal and mechanical damage to plants. Surface-disturbing activities generally are considered a direct adverse impact to grassland and shrubland communities. Livestock grazing, wildlife use, wildland fire, and vegetative treatments (e.g., prescribed fire, mechanical, chemical, or biological) also have direct impacts on these communities, which may be both adverse and beneficial. Indirect impacts to grassland and shrubland communities result from activities that alter the quality and health of these communities. For example, activities resulting in soil compaction, erosion, changes in hydrology, and encroachment of INNS are considered indirect impacts. Beneficial impacts to grassland and shrubland communities include activities that minimize, reduce, or prevent the spread of INNS into these communities and vegetative treatments to improve these communities.

For the purpose of this analysis, short-term impacts to grassland and shrubland communities comprise those activities that contribute to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Long-term impacts to grassland and shrubland communities are those that require more than 5 years to manifest on the surface. Refer to Map 21 for vegetation.

4.4.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Almost all surface disturbances from oil and gas development could occur within grassland and shrubland communities.
- Removal of sagebrush produces long-term impacts to the sagebrush community.
- Based on the definition of surface-disturbing activity (see Glossary), energy development is identified as the primary source of surface disturbance in the planning area.
- Surface disturbances generally increase the potential for accelerated erosion.
- Surface disturbances substantially increase the likelihood of the spread of INNS in an area.
- The placement of supplements can affect the distribution of livestock grazing within grassland and shrubland communities.
- Grazing and browsing, whether by livestock or wildlife, is important for maintaining the health of grassland and shrubland communities. Improper grazing can decrease plant vigor and ground cover, lead to increased erosion, degrade soil nutrients and water retention, and impact rangeland health.
- Grazing practices can maintain, improve, or degrade rangeland health. The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) are designed to maintain or improve rangeland health and are applied under all alternatives.
- The BLM and grazing lessees strive to manage livestock grazing to maintain or improve rangeland health.
- The primary conduit for the initial establishment of the spread of INNS is through the road network.

- Fire plays an intricate role in these communities, particularly shrubland communities.
- Prescribed fire is a tool used to manage vegetative communities and can result in short-term adverse impacts with long-term beneficial impacts to wildlife and certain desirable wildlife habitats.

4.4.2.2 Analysis of Alternatives

Allowable uses and management actions that could impact grassland and shrubland communities include all surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, OHV use, control of INNS, and proactive management actions. These allowable uses and management actions are expected to result in changes that directly or indirectly influence diversity, productivity, successional stage, nutrient cycling, and continuity of grassland and shrubland communities.

Impacts Common to All Alternatives

The types of impacts projected to occur to grassland and shrubland communities because of the various alternatives are similar; however, the extent and intensity of impacts is anticipated to vary by alternative. Therefore, impacts to grassland and shrubland communities from surface-disturbing activities, livestock and native ungulate grazing, OHV use, fire and fuels management, and proactive management actions are described under the individual alternatives. Described below are potential types of impacts common to all alternatives.

Surface-disturbing activities occur under all alternatives. BMPs for surface-disturbing activities are applied under all alternatives. Under normal circumstances, standard mitigation guidelines are effective in minimizing impacts to resources; however, conditions such as steep slopes, highly erosive soils, or extreme environmental events may require more aggressive management actions to mitigate adverse impacts. However, any surface-disturbing activity that removes sagebrush creates a long-term impact to the sagebrush community due to the slow regeneration and growth of sagebrush.

Surface disturbance also can indirectly impact grasslands and shrublands by contributing to the transport of INNS along the network of roads and watersheds. Soil compaction and erosion, modified fire-return intervals, and the spreading of INNS into native habitats are potential indirect impacts to grasslands and shrublands. Habitats are degraded, lost, and fragmented by activities such as fire and fuels management, grazing by livestock and wildlife, road and trail building, OHV use, and recreational activities.

Surface disturbance that occurs under each alternative will be reclaimed. The sooner successful reclamation occurs, the greater the benefit to grasslands and shrublands. Reclamation plans are developed and implemented on newly disturbed areas and for existing disturbances, as needed. Follow-up seeding and (or) corrective erosion control measures are required on areas of surface disturbance that experience reclamation failure until an acceptable stand of vegetation is achieved.

Grazing (both livestock and wildlife) provides both adverse and beneficial impacts to grasslands and shrublands, depending on grazing intensity, timing and season of grazing, range conditions, and precipitation regimes. Grazing can result in direct mortality to native plants through trampling or herbivory, indirect impacts due to soil compaction and erosion, changes in plant community composition and structure, and increased spreading of INNS (Fitch and Adams 1998). Native grasslands evolved with grazers and many grass species respond to leaf removal by spreading, which increases vegetation cover. Other beneficial impacts of grazing include reduction in competition by removal of encroaching woody plant cover; hoof action that keeps topsoil loose, increases litter and precipitation penetration, and incorporates seeds into soil; nutrient recycling; removal of wildfire fuels; and control of INNS with properly timed grazing rotations and (or) species (e.g., goats). Rangelands provide open space and habitat for many wildlife species.

Other than under Alternative A, future use of certified weed-free seed reduces the establishment and spread of INNS for revegetation projects. Similarly, requiring certified weed-free forage to supplement livestock feeding could reduce the introduction and spread of INNS in these areas. However, wildlife and livestock continued use of areas where INNS are established serve as vectors for spreading INNS seeds and plant parts.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities from all actions listed in Appendix M could impact grassland and shrubland communities. Under Alternative A, surface-disturbing activities are evaluated on a case-by-case basis. Surface disturbance directly impacts plant communities through vegetation removal and mechanical damage to plants. Indirect impacts of surface disturbance on vegetation include soil compaction, erosion, changes in soil productivity, hydrology, and encroachment by INNS. These indirect impacts can limit recovery or rehabilitation of vegetative communities following disturbance. Conversely, vegetation treatments (e.g., mechanical methods, prescribed fire, prescribed grazing, or chemical treatment), while resulting in short-term disturbance, will result in long-term beneficial impacts to grassland and shrubland communities. Vegetation treatments can achieve vegetative objectives to increase plant and seral stage diversity, control INNS, improve the quality and quantity of vegetation for wildlife and livestock, and create or maintain the desired mosaic.

Under Alternative A, surface-disturbing activities will acknowledge existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current standard practices, the Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities, and the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a). Surface-disturbing activities are managed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reestablishment of vegetation over disturbed soils would usually occur within 3 years of initial seeding. If unsuccessful within 3 years of initial seeding, follow-up seeding and soil nutrient testing will occur to determine if additional reclamation is needed.

Under Alternative A, short-term and long-term disturbances from BLM actions affect the largest amount of acreage of all alternatives. Under Alternative A, the impacts to grassland and shrubland communities associated with surface-disturbing activities are expected to be primarily adverse. Short-term impacts occur in the 5 years following the disturbance and include damage to vegetation and spread of INNS. Long-term impacts occur beyond 5 years and primarily include loss of vegetation communities and habitats due to land development. Based on the case-by-case basis of reclamation actions under Alternative A and the projected amount of long-term disturbance acreage, Alternative A is expected to have the greatest short- and long-term adverse impacts to grassland and shrubland communities of the alternatives.

Fire and Fuels Management. Wildland fire and prescribed fire both have adverse and beneficial impacts on grassland and shrubland communities. In the short term, fire results in the direct loss of vegetation and, potentially, habitat, increased soil erosion and reduced water infiltration, and can promote the spread of INNS by leaving bare soil, which can out-compete native plants. In the long term, because of the role fire historically played in these communities, fire can increase vegetative species and seral stage diversity across the landscape, rejuvenate decadent plants, and improve the overall health of these communities. In shrubland communities, the impacts resulting from fire usually are long term and depend on the scale and severity of the disturbance. The potential for sagebrush shrublands to revert to sagebrush depends on the acreage burned, the distance to seed sources, and the spread of INNS, such as

cheatgrass, which can increase fire frequency. Limiting or protecting acreage from fire may, in some cases, lessen direct loss of grassland and shrubland communities and reduce the potential spread of INNS in the short term, but considering fire's historical role, the lack of fire may decrease the overall long-term health of these communities.

Fire-suppression activities can limit short- and long-term fire damage to vegetation, but they also can cause mechanical and chemical damage to vegetation and increase the likelihood of INNS spread into an area. Direct short- and long-term impacts to grassland and shrubland communities can occur from wildland fire and from fire-suppression tactics. Using full suppression tactics and (or) limited tactics can damage and remove vegetation, a direct adverse impact, and potentially spread INNS seeds on vehicles, tools, and humans, an indirect adverse impact. If INNS are already present in an area, spread can occur regardless of the type of suppression used.

Fire management also can benefit grasslands and shrublands. Prescribed fire is an important vegetation management tool used to achieve a desired vegetative condition, but it also carries some risk of INNS establishment and increased soil erosion. Prescribed fire can help meet specific management objectives, such as maintaining a range of seral stages within shrublands; however, prescribed fires generally are not possible in areas with oil and gas development or the WUI.

Under Alternative A, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which also minimizes impacts to grassland and shrubland communities. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, which could improve habitats and result in a beneficial impact for grassland and shrubland communities. Based on the approach to fire management, Alternative A will have direct and indirect adverse impacts as well as beneficial impacts, to grassland and shrubland communities.

Livestock Grazing. Livestock grazing can have both beneficial and adverse impacts on the health and productivity of vegetative communities in rangelands. Over the last 50 years, rangeland conditions in the planning area have improved with the application of better grazing management practices. However, areas where rangeland health is most likely to be adversely impacted are areas where livestock congregate. These include areas containing water, shade, and (or) more palatable forage. Therefore, rangeland management often is geared toward improving the overall distribution of livestock within an allotment. This is accomplished through implementing BMPs, and developing allotment management plans (AMPs) or coordinated resource management plans, changing grazing systems, and implementing range improvement projects (i.e., fencing, water-development projects, and salt and mineral licks). Kovalchik and Elmore (1992) describe the compatibility of livestock grazing using different grazing systems with willow-dominated plant associations similar to those found in some riparian areas of the planning area.

In addition to congregation areas, livestock movement transports seed and propagates of INNS, thereby expanding infestations of these species. Congregation areas, transport of INNS, and adverse impacts to vegetation from past livestock grazing practices historically have contributed to the challenge of managing rangeland health and productivity in the planning area.

Through proper grazing management, livestock grazing can benefit rangeland health by improving plant vigor, increasing vegetative cover, reducing competition among plant communities, and reducing INNS infestations. Livestock grazing includes hoof action that breaks up soil crusts, which restrict water

infiltration and inhibit seedling establishment; removing old and decadent vegetation; and increase in spread and, therefore, cover and vigor of native vegetation, which decreases soil erosion. Healthier plant communities are more resistant to the spread of INNS and other undesirable plant species. One tool used to decrease the spread of INNS in an area is to have livestock graze an INNS species at a crucial point in its life-cycle. For example, goats can graze thistle prior to seed set and cattle can graze areas infested with the annual grass cheatgrass in early spring, thereby removing the ability to set seed that year, thus reducing plant numbers and making water and nutrients more available to native vegetation.

On the other hand, long-term over-utilization by livestock in grasslands and shrublands reduces abundance of certain native plants, allows less desirable forage species to increase, and allows INNS to enter and, in some cases, dominate communities. An indirect impact of overgrazing is a decrease in ground cover, resulting in an increase in runoff and soil erosion, which can impact the health of the entire plant community. These adverse impacts can be both short- and long-term.

The entire planning area currently is available for livestock grazing, with the exception of a few small parcels under Alternative A. Temporary nonrenewable permits have not been issued for unalloted parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means of improving range conditions on category I and maintaining M and C category grazing allotments (see Glossary). The trend of continued improvement in rangeland productivity in the planning area is expected to continue under current management. Native ungulates are anticipated to have similar adverse impacts as livestock in areas where they concentrate. Short- and long-term adverse impacts to grassland and shrubland communities are anticipated under Alternative A.

OHV Use. OHV use disturbs soils, removes vegetation, and contributes to the spread of INNS, thus potentially impacting grasslands and shrublands. Under Alternative A, OHV use in the planning area is limited to existing roads and trails, but operators may go off roads and trails to perform necessary tasks. Most of the Raymond Mountain WSA is designated as "closed" to OHV use.

OHV use on public lands can result in adverse short- and long-term impacts to vegetation in grassland and shrubland communities. A one-time disturbance resulting from OHV use causes physical damage to vegetation by breaking stems and branches and may disturb the soil surface depending on soil type, conditions, slope, and ground cover. Usually, with a one-time disturbance, plants and disturbed areas recover. However, with repeated use, new trails are established, resulting in long-term loss of vegetation, soil erosion, and spread of INNS into grassland and shrubland habitats. Areas where damage from OHV use is most likely to occur include stream crossings, areas with highly erosive soils, steep slopes, and vegetative communities with plants susceptible to physical damage, such as the woody plants. The soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative A are anticipated to indirectly and adversely impact grassland and shrubland communities.

INNS. Applying chemicals and other INNS control methods could remove vegetation or cause soil disturbance, which can adversely impact grassland and shrubland communities. Under Alternative A, appropriate methods, herbicide types, and applications are used in areas of riparian vegetation, wetlands, and special status plant species, and can affect grassland and shrubland habitats within the restricted areas. IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS.

Proactive Management Actions. Beneficial long-term impacts to grassland and shrubland health occur under each alternative to varying degrees by managing a percentage of these communities for other resources, such as wildlife migration routes and special status plant and wildlife species. Under

Alternative A, vegetation resources are managed to comply with the ESA and BLM policy associated with management of special status species. Prescribed fire, wildland fire, and appropriate chemical, mechanical, and biological treatments are used to improve plant community health and meet resource objectives. Adverse impacts to grassland and shrubland communities may occur from Alternative A having no regulations on the use of weed-free seed, mulch, forage, or other feeds that may introduce INNS to uninfested areas.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected short- and long-term surface disturbances from BLM actions to grasslands and shrublands are the lowest of all alternatives. Under Alternative B, less than half the acres of short-term surface disturbance and approximately one-third the acres of long-term disturbance are anticipated in the planning area compared to Alternative A. There is about 45 percent less acreage of federal mineral estate administratively available to oil and gas leasing compared with Alternative A, with the majority (84%) subject to the terms and conditions of a standard lease plus major constraints. Under Alternative B, there are increased restrictions on habitat fragmentation and protections for special status wildlife and plant species, which benefit the grassland and shrublands communities that support these species and minimize the spread of INNS and soil erosion.

Similar to Alternative A, surface-disturbing activities comply with current standard practices, the Wyoming BLM Mitigation Guidelines, and the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a). In addition, proposals for surface-disturbing activities within the planning area require prior soil surveys and analysis, knowledge of which would benefit all plant communities. This alternative prohibits surface-disturbing activities in areas identified as having fragile, chemical and biological crust, nonproductive, or low reclamation potential soil characteristics. Surface-disturbing activities are prohibited in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate mitigation developed for site-specific erosion control and disturbances. Unlike Alternative A, transportation and (or) travel management plan(s) will be completed within five years of the ROD in areas with high oil and gas development and recreational use Alternative B provides greater protection and minimizes impacts to soils compared to Alternative A, which provides greater protection and minimizes potential impacts to associated grassland and shrubland communities.

A reclamation plan will be developed and approved prior to any surface-disturbing activities being authorized. Interim reclamation of surface disturbance is required within the first planting season after the rig is moved off location. Final reclamation of well locations will begin within the first planting season once the well has been plugged. For surface disturbance that occurs under authorized activities other than oil- and gas-related actions, reclamation occurs within the first suitable planting season after operations have ceased. The objective for this alternative is to reestablish a healthy native plant community based on preexisting vegetation composition or other species as identified in an approved management plan. Monitoring of reclamation success would begin during the first growing season after seeding. Performance standards will be based on site-specific objectives for reclamation and will be identified in the approved reclamation plan. If performance standards are not met at any point within the time frames identified in the reclamation plan, additional testing would be completed in order to guide further reclamation efforts necessary to meet the identified performance standards. Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on pre-existing species composition or other species as identified in an approved management plan.

Under Alternative B, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature as described under Alternative A, but differ in intensity and duration due to the decrease in number of acres disturbed and more stringent reclamation requirements. Based on the acreage of

surface disturbance and the management actions implemented to reduce disturbance to grassland and shrubland communities, adverse impacts under Alternative B are expected to be less than Alternative A and all other alternatives.

Fire and Fuels Management. Alternative B is similar to Alternative A for fire suppression except that under Alternative B, soil disturbances are not allowed during suppression activities without the consent of the authorized officer. Similar to Alternative A, prescribed fire, as well as chemical, biological, and mechanical treatments, could be used to meet fire and fuels resource management objectives, except the objectives to be met are based on acreage thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Direct and indirect adverse impacts to grassland and shrubland communities from fire and fuels management under Alterative B are expected to be less than under Alternative A.

Livestock Grazing. Under Alternative B, the planning area could be available for livestock grazing on a case-by-case basis where livestock grazing is not in conflict with other resources. No temporary nonrenewable permits are issued for unalloted parcels. Unalloted public lands containing riparian areas are managed with an emphasis on wildlife and watershed objectives. Areas including designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coal mines, sensitive cultural sites, oil- and gas-production facilities, and the Mike Matthias Wetlands at Wheat Creek Meadows are not available for livestock grazing. Under Alternative B, grazing system and range improvements are implemented to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources.

Alternative B generally allows livestock grazing over the same area identified under Alternative A; however, areas identified for the protection of specific resource values would not be available under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands, including areas that support special status wildlife and plant species. Due to stricter management of livestock grazing, direct and indirect adverse impacts to grasslands and shrublands under Alternative B are expected to be less than under Alternative A and the other alternatives.

OHV Use. Under Alternative B, the same types of impacts described under Alternative A from OHV use are expected to occur; however, the extent of these impacts is expected to be less. Under Alternative B, a larger portion of the planning area is closed to OHV use (33,896 acres). Travel management planning is required within five years of the ROD in areas with high oil and gas development areas and recreational use. No off-trail travel will be allowed. The soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative B are anticipated to produce the least indirect and adverse impacts to grasslands and shrublands compared to other alternatives.

INNS. Under Alternative B, aerial application of chemicals is not allowed within ½ mile of wetlands, riparian areas, and aquatic habitats, and vehicle and hand application is not allowed within ¼ mile of these same habitats. The greater the buffer area around sensitive resources that chemicals are applied or mixed, the less potential for impacts associated with vegetation removal, soil disturbances, or chemical spills to grassland and shrubland communities within the buffer area. Other implications for INNS due to wetland/riparian buffers include the difficulty in treating INNS within wetland systems. Therefore, there is the possibility of potential spread of INNS species where treatment options are limited under this alternative. IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS. In addition to this requirement, Alternative B requires the use of certified weed-free forage and feeds for livestock supplementation to prevent the establishment of new weed areas. Therefore, adverse impacts to grassland and shrubland communities associated with wet areas from the application of INNS-control methods may be less for Alternative B than under Alternative A, and the

threat of INNS spread would be reduced because Alternative A has no weed-free seed, mulch, forage, and feed stipulations. However, under Alternative B where chemical control is not allowed, INNS may spread via riparian areas into adjacent uplands.

Proactive Management Actions. Under Alternative B, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources). In comparison with the other alternatives, Alternative B also limits habitat fragmentation by maintaining connections among sagebrush, aspen, and mountain shrub communities and by maintaining or enhancing large contiguous blocks of these plant communities on BLM-administered land. In comparison with the other alternatives, Alternative B provides the least direct and indirect impacts and maximum protection of grassland and shrubland habitats.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short- and long-term surface disturbances from BLM management actions are the second highest of all alternatives. Under Alternative C, there are approximately 39,000 acres less short-term disturbance, but only 206 acres less long-term disturbance anticipated compared to Alternative A. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources and protection and mitigation to address these activities. Restrictions to oil- and gas-related activities and reclamation of surface-disturbance requirements are similar to Alternative A. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under this alternative. Direct and indirect adverse impacts to grasslands and shrublands from surface-disturbing activities under Alternative C are anticipated to be similar to or slightly less than under Alternative A.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. Soil disturbances are not allowed from heavy equipment during fire suppression unless public or private habitable structures or industrial facilities are at risk. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment some direct impacts are reduced. By not using prescribed fire, which results in habitat improvement, Alternative C has the greatest potential to cause direct and indirect adverse impacts to grassland and shrubland communities.

Livestock Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing, as well as on other public lands in the planning area. The Mike Mathias Wetlands at Wheat Creek Meadows are available for livestock grazing. Grazing systems and range improvements are implemented to maximize livestock grazing while maintaining (meeting standards and guides) other resource values. Restrictions on the location of salt or mineral supplements and range-improvement projects are the same as under Alternative A (i.e., they will not be allowed on areas with special status plant species). Due to a greater emphasis on livestock and less on vegetation habitat values under Alternative C, adverse impacts to grassland and shrubland communities are expected to be slightly greater than under Alternative A.

OHV Use. Under Alternative C, 32,787 acres are designated "closed" to OHV use. Limited off-trail travel is allowed to perform necessary tasks, as long as it does not cause resource damage or create new trails. The anticipated soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative C are expected to produce slightly less indirect adverse impacts to grassland and shrubland communities when compared to Alternative A.

INNS. For the aerial-, hand- and vehicle-application of herbicides, Alternative C restrictions are the same as for Alternative A, except that buffer areas for mixing of chemicals in areas of sensitive resources are reduced by one-fifth. This action is not likely to affect grassland and shrubland communities within the buffer area. In addition to the recommendation to use certified weed-free seed and mulch in restoration projects, Alternative C also recommends the use of certified weed-free forage and feeds to prevent the introduction and establishment of new weed areas. These recommendations can benefit grasslands and shrublands by reducing the potential for spread of INNS.

Proactive Management Actions. Under Alternative C, vegetation resources are managed to comply with the ESA and BLM policy associated with management of special status species (same as Alternative A). However, in contrast to alternatives A and B, prescribed fire is not used, all wildland fires are suppressed, and appropriate chemical, mechanical, and biological treatments would not be used meet fire and fuels management objectives, however these treatments could be used to meet vegetation management objectives. Under Alternative C, no BLM-administered lands are given special designation for protection of sensitive resources, and the currently proposed designation for the Raymond Mountain ACEC would be lifted. This would remove or reduce protections from more shrubland and grassland communities. Alternative C may result in direct and indirect impacts similar to Alternative A and has the least protection of grassland and shrubland habitats compared to other alternatives.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, short- and long-term surface disturbance is the second lowest of all alternatives. Alternative D is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. However, under Alternative D, approximately 1,400,000 acres of federal mineral estate are administratively available for oil and gas leasing consideration (slightly less than Alternative A), all of which are subject to the terms and conditions of the standard lease form. Approximately 50 percent of the acreage also is subject to moderate constraints and 34 percent is subject to major constraints.

Under Alternative D, protection and mitigation to address surface-disturbing activities are the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances, impacts, and fragmentation of habitats. Travel management plan(s) are required to be completed within five years of the ROD for areas of high oil and gas development and recreational use. As under Alternative A, surface-disturbing activities are avoided in areas of highly erosive, fragile, nonproductive, and (or) excessively steep slopes of 20 percent or greater. Any disturbance in areas with 20 percent or greater slopes will require additional consideration of slope stabilization and erosion-control techniques. Disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are avoided. Disturbances in these areas require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as under Alternative B.

Direct and indirect adverse impacts to grassland and shrubland communities from surface-disturbing activities under Alternative D are anticipated to be less than under alternatives A and C, but greater than Alternative B, primarily due to the anticipated surface-disturbance acreage.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which includes suppression of fires to provide for human health and safety. In addition, fire-suppression management minimizes the loss of property and threats to other surface owners, such as in areas of high density urban and industrial interface with intermingled BLM-administered lands. It also allows for achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but

maximizing the use of wildland fires to achieve management objectives). During suppression activities, soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Similar to Alternative B, prescribed fire, as well as chemical, biological, and mechanical treatments, are used to meet fire and fuels resource management objectives based on acreage thresholds and areas found in an approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Prescribed fire and wildland fire use can be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, similar to Alternative A, which could improve habitats and result in a beneficial impact for grasslands and shrublands.

Livestock Grazing. Alternative D is similar to Alternative A, except livestock grazing on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock similar to Alternative A. Protection buffers for placement of salt or mineral supplements are based on resource concerns (i.e., special status plant and wildlife species) on a case-by-case basis. Under Alternative D, direct and indirect adverse impacts to grassland and shrubland communities from livestock grazing are expected to be similar to Alternative A.

OHV Use. Alternative D closes the second greatest acreage to OHV use. Alternative D opens 159 acres to open OHV use, more than alternatives A and B. The soil disturbance, vegetation removal, and transport of INNS under Alternative D from OHV use are anticipated to produce less indirect and adverse impacts to grasslands and shrublands compared to alternatives A and C.

INNS. Similar to Alternative B, Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds for livestock supplements. Mixing of chemicals near sensitive resources may be conducted at distances similar to Alternative A. Weed-free seed and forage requirements can indirectly benefit grasslands and shrublands by reducing the potential for establishment and spread of INNS more than under Alternative A with no such requirements.

Proactive Management Actions. Under Alternative D, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources), but these are not as extensive as under Alternative B. Alternative D limits habitat fragmentation by maintaining connections among sagebrush, aspen, and mountain shrub communities, and by maintaining or enhancing large contiguous blocks of these plant communities on BLM-administered land (same as Alternative B). Alternative D provides greater protection to grassland and shrubland communities compared with alternatives A and C, but less protection than provided by Alternative B. Overall, Alternative D is anticipated to result in less adverse impacts to grassland and shrubland communities than alternatives A and C.

4.4.2.3 Conclusion

The impacts from surface-disturbing activities on grassland and shrubland communities are expected to increase as the acreage disturbed increases. Therefore, the alternatives with higher acreage disturbed will result in a greater adverse impact to these communities. The alternatives with lower acreage disturbed will result in lesser adverse impacts when compared to the other alternatives. Meaningful differences in long-term disturbance acreage, reclamation requirements for surface disturbance, management of livestock, OHV use and designations, fire-suppression tactics, and managing for wildlife and special status species in grassland and shrubland communities form the basis for the following conclusion: impacts to grassland and shrubland communities are anticipated to be the least adverse under Alternative B, followed by Alternative D, and are the most adverse under alternatives A and C.

4.4.3 Vegetation – Riparian and Wetland Communities

An impact to riparian and wetland areas affects the physical, chemical, or biological components of the ecosystem. Actions that contribute to the decline in abundance, distribution, or functionality of riparian and wetland communities are considered adverse impacts. Conversely, beneficial impacts to riparian and wetland communities are activities that protect or restore these habitat types in the planning area.

Direct impacts to riparian and wetland communities result from disturbing vegetation or ground surface occurring in these communities. Indirect impacts to riparian and wetland communities result from actions within a watershed that cause a change in riparian and wetland functionality (e.g., increased rates of sediment loading or changes in hydrology), a change in water chemistry, and spread of INNS. For the purpose of this analysis, short-term impacts to riparian and wetland communities include actions contributing to the decline in abundance or distribution of these communities within 5 years of when the activity occurs. Long-term impacts to riparian and wetland communities require more than 5 years to manifest on the ground. Refer to Map 7 for water resources and Map 21 for vegetation.

4.4.3.1 Methods and Assumptions

Evaluating potential impacts to riparian and wetland areas caused by changes in functionality or INNS establishment focuses on resource management actions that (1) cause surface disturbances or limit the impacts of surface disturbances and (2) are substantially different among the proposed alternatives. Estimates of projected surface disturbances are used as the primary metric for determining the relative level of potential, indirect impacts to riparian and wetland areas.

Methods and assumptions used in this impact analysis include the following:

- Surface disturbances generally increase the potential for accelerated sediment loading to streams.
- Surface disturbances generally increase surface runoff to streams due to an increase in impervious surfaces, changes in water routing, and loss of vegetation.
- Surface disturbances, transportation networks, ungulate use, and recreational activities increase the likelihood of INNS spread in an area.
- It is assumed that the greater the amount of surface disturbance in a watershed, the greater the probability that excess surface runoff and sediment will enter the stream and contribute to the loss of riparian and wetland functionality.
- Livestock use of riparian and wetland communities decrease as the distance to salt/mineral supplements increases beyond ¼ mile.
- Surface runoff to streams generally increases as livestock stocking rates increase. This is not a linear relationship. For example, low stocking rates typically have no measurable impact on surface runoff, moderate stocking rates typically have a negligible impact on surface runoff, high stocking rates have a measurable impact on surface runoff, and consecutive years of high stocking rates have the highest potential for increasing surface runoff to streams.
- Livestock and wildlife use typically is disproportionately higher in riparian and wetland communities than in upland communities. Improper grazing can adversely impact these communities throughout the year, but generally has greater impacts in the spring and early summer, when soils are wet and, therefore, more vulnerable to compaction and stream banks are more vulnerable to sloughing. Livestock, especially cattle, tend to congregate in these communities during the hot season (mid-to-late summer). While stocking rates for an allotment or pasture may be low to moderate, the utilization levels in riparian and wetland areas can be high.

- Riparian areas are evaluated during assessments for the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a).
- Grazing practices can maintain, improve, or degrade rangeland health. The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) are designed to maintain or improve rangeland health. Wildlife can adversely impact riparian and wetland areas depending on how many species, what type, and when the use of the area by wildlife occurs.
- Riparian and wetland areas are able to recharge and rebound faster than other vegetative areas in the planning area.

4.4.3.2 Analysis of Alternatives

Allowable uses and management actions that could impact riparian and wetland communities include surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, OHV use, INNS, and proactive management actions. Impacts to soil and water, which may impact riparian and wetland communities, are discussed in the Soil and Water sections earlier in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to riparian and wetland communities because of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative, as described under the individual alternatives.

Implementing any of the alternatives may cause direct and (or) indirect impacts; however, no quantification of direct impacts to riparian and wetland areas exist for any of the alternatives. Because the riparian and wetland areas are limited and often the most productive lands, they are disproportionately impacted by humans, livestock, and wildlife compared with the same types or extent of actions in upland areas. Direct impacts to riparian and wetland areas usually are avoided and minimized whenever possible under all alternatives. In general, impacts from projects or uses involving riparian areas are minimized through the application of BMPs.

Changes in water chemistry also can affect riparian and wetland areas primarily through changes in plant species composition, which could impact utilization of the area by wildlife and livestock. Indirect impacts caused by changes in water chemistry historically have not been a major factor in the planning area and are not expected to be in the future.

Usually, the impacts caused by wildlife are less extensive than those caused by livestock, particularly cattle. Elk, deer, and pronghorn are attracted to and often congregate in riparian and wetland areas; however, due to their smaller sizes and foraging habits, they typically do not cause the amount of disturbance that cattle do. In localized areas, elk have substantially impacted riparian habitats through trampling, wallowing, and grazing. Because they can rove across large areas and usually are not confined by fences, big game animals can disperse INNS seed over large areas and into other riparian and wetland habitats. Beaver can dramatically change the nature of a stream and the riparian and wetland areas associated with it. In most cases, the changes to the riparian and wetland areas created by beaver activity are beneficial.

The management of special status species generally involves restricting activities in the vicinity of special status plants or wildlife either year-round or during specific times of the year. As a result, riparian and

wetland areas occurring in the vicinity of buffer zones of special status species can benefit from the lower level of public use. Under all alternatives, no water development or salt, mineral, or forage supplements are allowed in areas inhabited by special status plant species. This restriction will prevent trampling of plants by livestock and changes to the soils that support special status plant species. The size of the buffers varies by alternative.

The use of certified weed-free seed mixes and, in some situations, the use of nonnative species could reduce the spread of INNS. Applying rangeland health standards and developing guidelines to maintain or improve riparian and wetland communities is a proactive action applying to all alternatives. The BLM will work with grazing lessees to manage livestock to accomplish this.

Salt cedar is a shrubby INNS and a concern in some riparian and wetland areas because it transpires large amounts of water, resulting in salinization of soil around the plant. This species is a phreatophyte, which is a deep-rooted plant that obtains water from the water table. As a result, salt cedar could exclude native riparian shrubs and herbaceous plants, thereby radically altering wildlife habitats and impacting other functions. Salt cedar is somewhat different from other INNS species in that surface disturbances outside of the riparian zone do not increase salt cedar's ability to invade riparian and wetland areas. In other words, salt cedar is invasive even in areas of low surface disturbance. All identified management actions to control INNS species consider all undesirable species equally and do not emphasize the eradication of salt cedar.

Alternative A

Surface-disturbing Activities. In the planning area, the following types of impacts may occur in riparian and wetland communities due to surface-disturbing activities. These types of impacts may occur under all alternatives; however, the intensity of the impacts varies by alternative.

Sediment and water are the two components of streamflow. Sediment inputs into a stream occur naturally due to the process of erosion. Streams and the adjacent riparian and wetland areas evolve over time in response to the amount of water and sediment they carry and (or) receive. A stream system generally is considered stable if the stream is in dynamic equilibrium with its water and sediment inputs. A stream may become unstable if the rate of water or sediment inputs change, such as with an accelerated rate of sedimentation or an increase in water quantity.

Accelerated erosion from uplands and bank erosion increase sediment loading to streams. Typical causes for increased sediment loading into a stream are flashfloods, changes from a relatively undisturbed condition to a more intensive land use in a watershed, surface disturbances in a watershed, improper livestock grazing practices, and wildlife use that alters vegetative cover. Higher sediment loads entering a stream can dramatically alter its form and, consequently, the performance of the riparian and wetland communities adjacent to it. The impact of increased sediment loading depends on the stream's ability to pass the sediment through the system and the size (i.e., disposal volume) of the stream and the channel slope gradient. In segments of a stream that have a lower gradient, deposition occurs and the stream channel aggrades (builds), possibly becoming braided and shallow. In some instances, the aggradations of the streambed at one location can cause the stream to down cut or degrade (become more incised) in upstream reaches as the stream seeks to restore its equilibrium. The additional material eroded from the upstream channel is transported down to the depositional area and the cycle continues. In such cases, the performance of the riparian and wetland areas in both the aggraded stream reach and the incised stream reach change.

Increases or reductions in water quantity also can impact riparian and wetland performance. Prolonged decreases in water quantity (e.g., during times of drought, due to diversions for irrigation, or due to

groundwater depletions) can cause a shift in plant species composition in riparian and wetland areas and increase the chances for INNS spread. Typically, plant species that prefer drier conditions do not bind the soil as well as riparian and wetland vegetation and, thereby, can cause a decrease in stream bank stability. Drier conditions also can lead to a decrease in productivity and impact the ability of the riparian area or wetland to support wildlife species.

Increases in surface runoff can have a beneficial impact on riparian and wetland areas because more water may be available for plant growth, thereby increasing plant productivity and abundance. However, increases in surface runoff volumes also can result in an increase in channel incision. This could disconnect the stream from its floodplain (i.e., gully formation). If the stream becomes incised enough, the conditions within associated riparian and wetland areas can become drier and a shift in plant species composition can occur, contributing to bank destabilization and, consequently, to increases in sediment loading.

Changes in surface runoff can occur due to natural or human causes. Natural causes include climatic cycles (e.g., periods of drought or high precipitation) and catastrophic events (e.g., flashfloods, fires, earthquakes, and landslides). Human impacts to surface runoff occur primarily due to land use changes. One of the most prevalent increases in surface runoff caused by human activity is an increase in impervious cover (e.g., roads, parking lots, and rooftops). Roads are not only impervious, they also route water. For this reason, it is undesirable to have a road close to a stream or crossings where runoff from the road is more likely to reach the stream. Improper livestock grazing and sometimes wildlife use also can increase runoff within a watershed due to soil compaction and loss of vegetative cover, with the amount of bare ground being the primary factor (Lusby 1970). Proper livestock grazing can increase vegetative cover and reduce peak runoff quantities to streams and levels of erosion.

Water production from CBNG wells and traditional oil and gas development represents a new water source within a watershed that augments existing water flows. In the event that produced water from CBNG or traditional gas development is disposed of on the surface, riparian and wetland vegetation, as well as the watercourse function, can be affected. The effects can be both beneficial and detrimental, as discussed in the Water Resources section. The loss of vegetative cover from both wildland fires and prescribed fires also can increase runoff and sediment to streams and other water bodies in the short term. A rainstorm following a fire can overwhelm downstream water bodies by contributing excessive amounts of sediment, large woody debris, and water to the system in a short period. Vegetation response after a fire can have beneficial impacts on a watershed by helping to recharge water tables and increasing the amount of herbaceous cover, thereby improving ungulate distribution and lessening erosion.

Under Alternative A, riparian areas are managed to preserve, protect, and restore natural functions. No new permanent facilities are allowed in floodplains, riparian areas, or wetlands, except to benefit watershed health or vegetation. Linear watercourse crossings are considered on a case-by-case basis. Surface-disturbing activities are avoided within 500 feet of riparian areas, 100-year floodplains, wetlands, and aquatic habitats. Outside this buffer area, surface-disturbing activities use existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current standard practices and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Surface-disturbing activities are developed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reestablishment of vegetation over disturbed soils would usually occur within 3 years of initial seeding. If vegetation establishment is unsuccessful within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed. While most surface-disturbing activities will not occur in riparian and wetland areas, these areas may be indirectly impacted due to soil erosion runoff from uplands, causing increases in sediment released into streams.

Under Alternative A, short-term and long-term disturbance acreages from BLM actions are the highest of all alternatives (see Table 4-1). Under Alternative A, the impacts to riparian and wetland communities associated with surface-disturbing activities are mostly indirect impacts and expected to be primarily adverse. Short-term impacts occur in the 5 years following the disturbance and include increased sediment into streams and the spread of INNS. Long-term impacts occur beyond 5 years and primarily include loss of habitat acreage due to permanent development.

Fire and Fuels Management. Under Alternative A, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources. Use of fire suppression chemicals, including foaming agents and surfactants, and fueling of equipment is not allowed within 200 feet of surface water sources. Although adverse impacts may occur under Alternative A, these restrictions will help to reduce adverse impacts.

Livestock Grazing. With proper grazing management and implementation of rangeland improvement projects, the health of riparian and wetland areas can be sustained or improved. All alternatives involve managing livestock grazing in riparian areas. The degree and extent of grazing-related impacts to riparian and wetland areas over the long term are expected to continue to improve. On the other hand, improper livestock grazing practices adversely impact riparian and wetland areas through soil compaction and hummocking, physical removal and destruction of vegetation, and trampling of stream banks, causing bank failure. Clary and Kinney (2000) indicate that the damage to riparian habitats because of bank alterations is greater than or equal to the damage caused by changes in vegetation biomass. Livestock grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize stream banks. Kovalchik and Elmore (1992) state that improper livestock grazing adversely impacts the stability of some riparian areas dominated by willow.

The planning area currently is available for livestock grazing, with the exception of a few small parcels. Temporary nonrenewable permits have not been issued for unalloted parcels. Under Alternative A, grazing system and range improvements will be implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on category I and maintaining M and C category grazing allotments (see Glossary). Placement of salt and mineral supplements is considered on a site-specific basis under Alternative A. By emphasizing monitoring on higher-priority allotments only (category I, see Glossary), undesirable conditions in lower-priority allotments may not be identified and deterioration may occur or improvement occurring in vegetative communities may not be realized in a timely manner. Adverse impacts to riparian and wetland areas from livestock grazing are anticipated under Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative A, camping is allowed throughout the planning area, which may adversely impact riparian areas and water resources. OHV use disturbs soils and removes vegetation, thus potentially impacting riparian and wetland resources. Current OHV use is limited to existing roads and trails, but operators may go off roads and trails to perform necessary tasks. Most of the Raymond Mountain WSA is designated as closed to OHV use. Linear crossings of watercourses are currently considered on a case-by-case basis. The anticipated soil disturbance, vegetation removal, and transport of INNS from these activities under Alternative A is anticipated to indirectly and adversely impact riparian and wetland resources.

INNS. INNS are particularly undesirable in riparian and wetland areas because nonnative species do not have the same high level of soil-binding properties that many native riparian and wetland species (e.g., willows and sedges) have. INNS, such as salt cedar, can form dense monocultures in riparian areas that

block wildlife access to water sources and use more water than native plants. The proximity of surface disturbances to riparian and wetland areas is one of the conditions allowing INNS to spread in these areas. INNS are typically spread through road networks, watercourses and wind, and most easily become established in disturbed areas. Livestock and wildlife also can disperse INNS seed. The interrelationships of livestock grazing, INNS control, and rangeland health are discussed in the Livestock Grazing section of this chapter.

Applying chemicals and other INNS control methods could remove vegetation or cause soil disturbance, which can adversely impact riparian and wetland communities. Under Alternative A, appropriate methods of herbicide type and application are used in areas of riparian vegetation and wetland resources. Aerial application of chemicals is not allowed within 100 feet of open water, vehicle application is not allowed within 25 feet, and hand application is not allowed within 10 feet. Chemicals are mixed a minimum of 500 feet from riparian areas and wetlands.

IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS and can indirectly benefit riparian and wetland resources. The BLM requires outfitters through their approved permit on public lands to use weed free hay, mulch, straw, and cubes, etc. in their operations.

Proactive Management Actions. Management actions that strive to improve streams and conserve riparian and wetland areas generally result in long-term, beneficial impacts to riparian and wetland communities. Under Alternative A, the management of water resources is performed according to existing regulations and with consideration for site-specific conditions. Activity plans are prepared on a case-by-case basis to reduce phosphate, sediment, and salt loading to downstream water bodies. Alternative A also requires avoiding surface-disturbing activities within 500 feet of the 100-year floodplain. These management actions will result in long-term, beneficial impacts to these communities under Alternative A.

Alternative B

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative B due to surface-disturbing activities are expected to be the same as described under Alternative A, except in intensity. Under Alternative B, riparian areas are managed for mid- to late-successional stage vegetation. No new permanent facilities, including road crossings, are allowed in floodplains, riparian areas, or wetlands. All linear underground facilities crossing watercourses will be bored on federal projects. Alternative B excludes surface-disturbing activities within ¼ mile of the 100-year floodplain, wetlands, riparian areas, and aquatic habitats. Outside this buffer area, soil surveys and (or) analyses are required for all proposed surface-disturbing activities; however, this alternative prohibits these activities in areas identified as having fragile, chemical and biological crust, nonproductive, or low reclamation potential soil characteristics. Under Alternative B, surface-disturbing activities are prohibited on sensitive or highly erosive soils or on slopes greater than 10 percent unless an adequate soil mitigation proposal is provided. The current NSO restriction for fluid minerals on slopes greater than 40 percent will continue under Alternative B. Unlike under Alternative A, transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities. Under Alternative B, the projected short- and long-term surface disturbances are the lowest of all alternatives, likely providing the most protection for riparian and wetland habitats. Under Alternative B, approximately 51-percent less short-term disturbance and approximately 67-percent less long-term disturbance will be anticipated in the planning area compared to Alternative A.

Under Alternative B, interim reclamation of surface disturbance from oil and gas activities occurs within the first suitable planting season after the rig is moved off location. Final reclamation of well locations will begin within the first planting season once the well has been plugged. For surface disturbance that occurs under authorized activities other than oil- and gas-related actions, a reclamation plan will be developed and approved prior to any surface-disturbing activities being authorized. Reclamation of surface-disturbing activities will be required within the first available planting season, as identified in the approved reclamation plan. Monitoring of reclamation success would begin during the first growing season after seeding. Performance standards will be based on site-specific objectives for reclamation and will be identified in the approved reclamation plan. If performance standards are not met at any point within the time frames identified in the reclamation plan; additional testing would be completed in order to guide further reclamation efforts necessary to meet the identified performance standards. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on preexisting species composition or other species as identified in an approved management plan. Alternative B increases restrictions on habitat fragmentation and protections for special status wildlife and plant species, which benefit riparian and wetland communities that support these species, minimizing the spread of INNS and soil erosion.

Under Alternative B, the adverse impacts anticipated from surface-disturbing activities are expected to be similar in nature as described under Alternative A, but differ in intensity and duration due to the decrease in number of acres disturbed and more stringent reclamation requirements. Based on the acreage of surface disturbance and the management actions implemented to reduce impacts to vegetation systems, Alternative B is anticipated to have the least adverse impacts to riparian and wetland communities of all the alternatives.

Fire and Fuels Management. Alternative B is similar to Alternative A for fire suppression, except under Alternative B, soil disturbances are not allowed within the planning area without consent from the authorized officer. Use of fire-suppression chemicals, including foaming agents and surfactants, are not allowed within 500 feet of surface water sources. Alternative B uses prescribed fire, as well as other treatments, to meet fire and fuels management objectives found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Direct and indirect adverse impacts to riparian and wetland communities from fire and fuels management under Alterative B are expected to be less than under Alternative A.

Livestock Grazing. The types of impacts to riparian and wetland communities under Alternative B from livestock grazing are expected to be the same as described under Alternative A, except in intensity. Under Alternative B, the planning area could be available for livestock grazing on a case-by-case basis where livestock grazing is not in conflict with other resources. No temporary nonrenewable permits are issued for unalloted parcels. Unalloted public lands containing riparian areas are managed with emphasis on wildlife and watershed objectives. Areas including designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coal mines, sensitive cultural sites, oil- and gas-production facilities, and the Mike Matthias Wetlands at Wheat Creek Meadows are not available for livestock grazing. Under Alternative B, grazing system and range improvements are implemented to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources. Salt or mineral supplements are located a minimum of ½ mile away from water resources and riparian areas. Placing supplements away from riparian and wetland communities will attract livestock away from these areas, improve livestock distribution in an allotment, and reduce impacts to these communities.

Alternative B generally allows livestock grazing over the same area identified under Alternative A. However, areas identified for the protection of specific resource values would be unavailable for grazing under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands, including areas that support special status wildlife and plant species. Due to stricter

management of livestock grazing, direct and indirect adverse impacts to riparian and wetland resources under Alternative B are expected to be less than under Alternative A and have the least amount of adverse impacts on riparian and wetland communities of all alternatives.

Recreation, OHV Use, and Dispersed Travel. Under Alternative B, riparian areas throughout the planning area are closed to camping. The same types of impacts described under Alternative A from OHV use are expected to occur; however, the extent of these impacts is expected to be less. Under Alternative B, more area would be closed to OHV use (33,896 acres). Motor vehicle travel and OHV use is limited to crowned and ditched roads. The anticipated soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative B are anticipated to produce the least indirect and adverse impacts to riparian and wetland resources compared to other alternatives.

INNS. Under Alternative B, aerial application of chemicals is not allowed within ½ mile, and vehicle and hand applications are not allowed within ¼ mile, of riparian and wetland areas. Chemicals are mixed a minimum of ¼ mile from riparian areas and wetlands, reducing the possibility of chemical spills into a water system more than for other alternatives. The downside, however, is that because chemical control options are not allowed in riparian systems, the chance of INNS infestation or spread along these watercourses could increase. However, the use of biological and mechanical means to control INNS in riparian systems remains an option. IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands, which reduces the threat of establishment or spread of INNS and can indirectly benefit riparian and wetland resources. In addition to this requirement, Alternative B requires the use of certified weed-free forage and feeds for livestock supplements to prevent the establishment of new weed areas.

The greater the distance from riparian areas and wetlands that chemicals are applied or mixed, the lesser the potential for impacts associated with vegetation removal, soil disturbances, or chemical spills. Therefore, direct and indirect impacts to riparian and wetland resources associated with application of INNS control methods will be less for Alternative B than Alternative A. There is, however, an increased chance that INNS may be able to infest or spread through riparian areas with fewer control options available. Requiring the use of certified weed-free forage and feed to prevent the establishment of new weed areas will indirectly benefit riparian vegetation and wetland resources.

Proactive Management Actions. Under Alternative B, activity and (or) project plans are prepared to reduce phosphate, sediment, and salt loading to downstream water bodies, including Bear Lake and the Flaming Gorge Reservoir. Disposal of produced water to waters or streams is prohibited. Alternative B also prohibits surface-disturbing activities within ¼ mile of the 100-year floodplain, wetlands, riparian areas, and perennial streams. Alternative B implements more protective measures than the other alternatives for riparian, wetland, and surface water areas from fire suppression, INNS control, and recreational activities, and has the least adverse impacts due to these activities of all the alternatives. Alternative B also provides the greatest area within BLM-administered lands that will be given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources). The beneficial impacts for wetlands and riparian areas under Alternative B are the greatest of all alternatives.

Alternative C

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative C related to surface-disturbing activities are expected to be slightly less than those for Alternative A. Under Alternative C, riparian areas are managed similarly to Alternative A; however, new permanent facilities are allowed in floodplains, riparian areas, or wetlands, provided there are no practicable alternatives and sufficient mitigation is undertaken so that the action will meet the

requirements of Executive Orders (EOs) 11988 and 11900. Linear watercourse crossings are considered on a case-by-case basis (same as Alternative A). Avoidance of surface-disturbing activities in riparian areas, 100-year floodplains, wetlands, and aquatic habitats are the same as under Alternative A.

Under Alternative C, the projected short- and long-term surface disturbances from BLM actions are the second highest of all alternatives. Under Alternative C, there are approximately 39,000 acres less short-term disturbance, but only 206 acres less long-term disturbance anticipated compared to Alternative A. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources and protection and mitigation to address these activities. Also, transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under the alternative. Restrictions to oil- and gas-related activities and reclamation of surface disturbance requirements are similar to Alternative A. Reclamation of surface disturbance is the same as Alternative A. Direct and indirect adverse impacts to riparian and wetland resources from surface-disturbing activities under Alternative C are anticipated to be similar or slightly less than under Alternative A.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. Soil disturbances are not allowed from heavy equipment during fire suppression unless private or public habitable structures or industrial facilities are at risk. Use of fire-suppression chemicals, including foaming agents and surfactants, is allowed in the planning area. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment some direct impacts are reduced. However, by not restricting fire-suppression chemicals, and not using prescribed fire, which could lead to habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts to the health of riparian and wetland resources.

Livestock Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area. The Mike Mathias Wetlands at Wheat Creek Meadows is available for livestock grazing. Grazing system and range improvements are implemented to maximize livestock grazing while maintaining (meeting standards and guidelines) other resource values. The placement of salt and mineral supplements is managed similar to Alternative A. Due to greater emphasis on livestock values under Alternative C, impacts to riparian and wetland resources are expected to be greater than Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative C, camping is allowed throughout the planning area (same as Alternative A), which often affects riparian areas. Also under Alternative C, the number of acres closed to OHV use is the same as Alternative A. All existing roads and trails are open to motor vehicle and OHV use in the planning area, except in the Raymond Mountain WSA. Limited off-trail travel also is allowed to perform specific tasks, including surveying, maintenance, weed spraying, and fence repair. The anticipated soil disturbance, vegetation removal, and transport of INNS by OHVs under Alternative C are anticipated to produce less indirect and adverse impacts to riparian and wetland resources compared to Alternative A.

INNS. BLM management for INNS under Alternative C is the same as Alternative A, except that chemicals may be mixed at a minimum of 100 feet (less distance than Alternative A) from sensitive water resources, including riparian vegetation and wetlands. The lesser the distance from sensitive resources that chemicals are mixed, the greater the potential for spills to adversely impact these areas. In addition, Alternative C recommends the use of certified weed-free seed and mulch and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas, which can indirectly benefit riparian and wetland resources.

Proactive Management Actions. Under Alternative C, activity and (or) project plans are prepared to reduce phosphate, sediment, and salt loading to downstream water bodies and are developed similar to Alternative A. Avoidance areas for surface-disturbing activities also are similar to Alternative A. Under Alternative C, prescribed fire, wildland fire use, and chemical, mechanical, and biological treatments could be used to meet vegetation management resource objectives. Under Alternative C, no areas within BLM-administered lands are given special designation for protection of sensitive resources. Alternative C provides the least protection of riparian and wetland resources when compared to the other alternatives.

Alternative D (Proposed RMP)

Surface-disturbing Activities. The types of impacts to riparian and wetland communities under Alternative D for surface-disturbing activities are expected to be the similar to those described under Alternative A. Under Alternative D, riparian areas are maintained, improved, or restored to enhance habitat forage conditions for wildlife and livestock and improve stream water quality. Riparian areas are managed with sensitive wildlife and plant species concerns to a successional stage appropriate for the benefit of those species, including vertical as well as horizontal vegetative structure and composition. No new permanent facilities are allowed in riparian areas or wetlands unless (1) they meet the requirements and intent of EOs 11988 and 11990, (2) there are no practicable alternatives, and (3) appropriate mitigation measures are implemented. Linear watercourse crossings are considered on a case-by-case basis (same as Alternative A). Avoidance of surface-disturbing activities in riparian and wetland areas is similar to Alternative A.

Short- and long-term disturbance from BLM actions for Alternative D are the second lowest of all alternatives. Alternative D is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. However, under Alternative D, approximately 1,400,000 acres of federal mineral estate are administratively available for oil and gas leasing consideration (slightly less than Alternative A), all of which are subject to the terms and conditions of the standard lease form. Approximately 50 percent of the acreage also is subject to moderate constraints and 34 percent are subject to major constraints.

Under Alternative D, protection of riparian and wetland areas and mitigation to address surface-disturbing activities is the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances, impacts, and fragmentation of habitat areas. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. Oil- and gas-related activities are restricted on slopes greater than 25 percent and NSO restrictions for fluid minerals are implemented for slopes greater than 40 percent, as in Alternative A. In addition, surface-disturbing activities are avoided in areas of sensitive, highly erosive, and excessively steep slopes of 20 percent or greater, and any disturbance in areas with 20 percent or greater slopes requires additional consideration of slope stabilization and erosion-control techniques. Disturbances on soils with fragile steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are avoided and require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as Alternative B. Direct and indirect adverse impacts to riparian and wetland resources from surface-disturbing activities under Alternative D are anticipated to be less than under alternatives A and C, but greater than Alternative B.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows an AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which includes suppression of fires to first provide for human health and safety and minimizing loss of property and threats to other surface owners, such as in areas of high-density urban or industrial interface with intermingled BLM-administered lands, but also for allowing achievement of resource objectives in areas

where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). During suppression activities, soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Use of fire-suppression chemicals is managed similar to Alternative A. The use of prescribed fire, as well as chemical, biological, and mechanical vegetation treatments, is similar to Alternative B based on acreage thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). Therefore, impacts to wetlands and riparian areas under this alternative have similarities to both alternatives A and B.

Livestock Grazing. Alternative D is similar to Alternative A, except livestock grazing on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock the same as Alternative A. Salt or mineral supplements are located a minimum of ¼ mile from water resources riparian areas, and NHTs. Under Alternative D, direct and indirect adverse impacts to riparian and wetland resources are expected to be similar to Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative D, only dispersed camping is allowed within 200 feet of a water source, except where developed camping facilities currently exist. The Pine Creek Canyon riparian conditions are monitored; camping will be relocated away from areas where resource damage is occurring. Alternative D closes more acres to OHV use than alternatives A and C, but less than Alternative B. The anticipated soil disturbance, vegetation removal, and transport of INNS by OHVs under Alternative D are anticipated to produce less indirect and adverse impacts to riparian and wetland areas compared to Alternative A.

INNS. Alternative D is similar to Alternative A, except that Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas (same as Alternative B). Mixing of chemicals near sensitive resources may be conducted at distances similar to Alternative A. These management actions can indirectly benefit riparian vegetation and wetlands more than Alternative A by reducing the potential for establishment and spread of INNS and decreasing spills that reach waterways.

Proactive Management Actions. Under Alternative D, activity and (or) project plans prepared to reduce phosphate, sediment, and salt loading to downstream water bodies are designed similar to Alternative B. Under Alternative D, prohibition of surface-disturbing activities is similar to Alternative A. Under Alternative D, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife corridors, special status plants and wildlife, cultural resources), but these would not be as extensive as Alternative B. Alternative D provides greater protection to riparian and wetland resources when compared to alternatives A and C, but less protection than the maximum provided by Alternative B.

4.4.3.3 Conclusion

The following conclusion is based on differences in short- and long-term disturbance acreage; reclamation requirements for surface disturbance; management of livestock, including placement of supplements; recreational and OHV use designations; fire suppression and INNS control tactics; and managing for wildlife and special status species: impacts to riparian and wetland communities are anticipated to be the least adverse under Alternative B, followed by Alternative D, and the most adverse under alternatives A and C.

4.4.4 Fish and Wildlife Resources – Fish

Actions that could occur through implementing each alternative could affect fish resources. This section describes the impacts of each alternative on fish resources in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

Both natural events and human activities that influence water quality and water quantity can produce beneficial or adverse impacts to fisheries habitats. Direct impacts can result from onsite disturbance to fisheries habitats and indirect impacts can result from changes in water quality and quantity. Management actions that increase rates at which sediment is transported to and through streams increase deposition within the streams and could adversely impact fish. Refer to Appendix M for data regarding surface-disturbance acreage and the number of actions by alternative. Refer to Map 7 for water resources in the planning area.

In addition to their ecological importance, fish are a valuable resource for humans. Management actions that impact access to this resource for recreational use by the public would be a direct impact on fisheries management.

4.4.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Activities that cause substantial disturbance to soils and vegetation may adversely impact water quality and quantity, which would adversely impact fisheries habitats.
- Surface disturbances can result in accelerated runoff and sediment delivery to stream channels, which can alter streamflows and reduce habitat quality for fish that require clear water, moderated streamflows, and clean substrates.
- Increased sedimentation adversely impacts most fish species in the planning area. This analysis, therefore, focuses on the degree of surface disturbance anticipated to occur under each alternative.
- Activities affecting water quantity are regulated by the Wyoming State Engineer's Office.
- Activities affecting water quality are regulated by the Wyoming DEQ.
- Designation of ACECs for special status fish species generally improves water quality for all fish species.
- The potential for sedimentation of streams and rivers is minimized through using BMPs.

4.4.4.2 Analysis of Alternatives

Allowable uses and management potentially impacting fish include all surface-disturbing activities, concentrated livestock and native ungulate grazing, OHV use, fire and fuels management, wind-energy development, and proactive management actions. Potential impacts to fisheries generally occur in two categories—water quality and water quantity—due to the limited number of fish-bearing stream segments occurring on public lands. These categories serve to organize the description of potential impacts for each alternative.

Impacts Common to All Alternatives

The types of impacts projected to occur to fish because of the various alternatives are similar; however, the intensity of impacts varies by alternative. Impacts to water quality and quantity are described in

general below and in more detail in the Water section in this chapter. Impacts to fish from changes in water quality and water quantity are described under individual alternatives.

Water Quality Impacts

Under all alternatives, fisheries resources could be impacted by resource management actions that alter water quality through sedimentation and related degradation from surface-disturbing activities, water temperature changes, water chemistry changes, and riparian management and restoration.

Sedimentation of streams and rivers could be caused by any surface disturbance that removes vegetation and loosens the surface soil, which ultimately is deposited in streams and rivers. The amount of sediment that reaches streams and rivers depends on many factors, including slope gradient, soil type, sediment control measures, distance from the disturbance to the channel, and the type and amount of vegetative cover. The highest potential for surface disturbance under all alternatives is anticipated from BLM actions in fire and fuels management, mineral development, wind-energy development, powerlines, and vegetation treatments (Appendix M). Soil disturbance also could result from forest management activities, OHV use, livestock grazing, and the reclamation of disturbed areas.

Livestock and wildlife grazing can increase sediment entering streams from animal concentration areas, the collapsing of banks, stream-channel alteration, and removal of vegetation in riparian areas. Livestock and wildlife grazing in riparian areas can prevent regeneration of woody and herbaceous riparian vegetation necessary to stabilize stream banks. Soil disturbance from livestock grazing is minimized through implementing the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) under all alternatives. In addition, salt, mineral, and other livestock supplements near riparian areas, wetlands, and other waters could adversely impact water quality.

Increased sediment in streams, rivers, and reservoirs decreases the potential for wild fish to naturally reproduce, fills in pools, leads to channel degradation, and increases stream temperatures. Changes in water temperature also result from changes in the amount of vegetative cover. Changes in the aquatic habitat would lead fish to alter their uses of the stream, moving to different areas for feeding and spawning, depending on habitat conditions. Changes in water chemistry result from fire and fuels management and the use of retardant or foam near riparian areas and water sources.

Water Quantity Impacts

Water quantity may be impacted by activities that alter water runoff and water disposal. In areas with little vegetation, more rainfall may reach the stream systems because it does not infiltrate the soil. However, greater runoff can cause accelerated erosion and increased sediment loading in streams. Impervious surfaces and compacted soils may result in higher volumes of water reaching the stream system in shorter periods, thus increasing flooding frequency, volume, and erosion.

Oil and gas developments require anywhere from between 2 to 5 acre feet of water withdrawal in order to drill and complete the well location. These waters are typically withdrawn from either a local water well, stream or municipality (which draws waters from a specific water way). In addition, lower waters may exacerbate the impacts of sedimentation, salt and other impacts and needs to be identified within both the quantity and quality sections of the document.

Alternative A

Water Quality Impacts

Compared to the Action Alternatives, Alternative A allows the second greatest acreage of federal mineral estate (337,076 acres) administratively available to oil and gas and other leasables with standard constraints. Some of this development is projected to occur in areas that drain into Class 1 or 2 streams. The State of Wyoming requires an antidegradation policy for Class 1 streams, whereas Class 2 streams require that the designated uses be sustained.

Alternative A provides for preserving the natural functions of riparian areas by avoiding surface-disturbing activities within 500 feet of wetlands, riparian areas, aquatic habitats, and 100-year floodplains. Other activities proposed under Alternative A that could result in surface disturbance and contribute to sedimentation include OHV use, the mining of coal, trona, and salable and locatable minerals, the development of wind-energy sites, and forest management. For example, Alternative A designates the smallest acreage closed to OHV use and the second highest acreage with seasonal closures. As such, some degree of unauthorized road proliferation would continue, which could contribute sedimentation to surface water bodies. Structures associated with road and trail construction could intercept surface water runoff and divert sediment to the stream systems. No decisions are made under Alternative A regarding wind-energy development. Increased sedimentation resulting from the activities identified above would likely impact fisheries habitats within the planning area under Alternative A. No new ACECs are designated under Alternative A to protect fisheries habitats; however, the Raymond Mountain ACEC designated under Alternative A addresses Bonneville cutthroat trout habitats, thereby potentially benefiting other fisheries habitats. Alternative A manages 13 eligible waterway segments to protect the free-flowing values and tentative classification of these waterway segments as wild and scenic rivers. If produced water from well-drilling operations were to be disposed to surface waters, increased rates of erosion and entrainment of salts and sediment into the water column may occur, as could secondary degradation of water quality.

Water Quantity Impacts

Alternative A imposes the second fewest restrictions on activities that remove vegetation and compact soils. This would result in increased storm water runoff entering streams. This alternative is projected to have the second highest number of federal wells drilled (1,012 wells). Although the potential for CBNG is limited in the planning area, produced water from these types of wells could impact water quantity. The disposal of this water is subject to local, state, and federal laws and regulations. Disposal options for produced water from oil and gas wells include containment, enhanced infiltration, reinjection, or surface disposal. Disposal of produced water to surface waters could affect surface water quantity; however, there are currently no surface disposals of produced water to surface waters within the Kemmerer planning area (Roberts 2006).

Produced water from CBNG wells and other oil and gas wells can be authorized for disposal under Onshore Order No. 7 contributing additional flows to the surface water system. However, water disposal must comply with Wyoming DEQ and the Colorado Salinity Compact requirements. These disposals can alter the timing, location, and volume of local streamflow patterns. Produced water disposal also can increase erosion rates in stream channels along with instream flows and augment sedimentation in streams. However, BLM policies and BMPs, required as conditions of approval, minimize and mitigate, to the extent possible, erosion resulting from produced water surface disposal. Aquatic species may be impacted by produced water disposal to the surface, especially during periods of low flow and spawning. The volume of surface water disposal and the channel capacity of the receiving stream determine the change, if any, to stream characteristics. Because disposal water must meet DEQ water quality standards, the quantity of produced water, if disposed, is anticipated to be similar to existing surface waters and have

negligible direct beneficial or adverse impacts. If the disposed water causes increased rates of erosion and entrainment of salts and sediment into the water column, then secondary degradation of water quality could occur.

Alternative A does not actively address human-caused barriers to fish movement. However, the Gold Book standards for culvert installation do address proper culvert installation for streams.

Alternative B

Water Quality Impacts

Alternative B proposes less surface disturbance over the long term compared with Alternative A and the least of all alternatives. Compared to Alternative A, fewer opportunities exist for surface-disturbing activities, including oil and gas development, roads, powerlines, and vegetation treatments. Alternative B implements more restrictions than Alternative A, including closing areas within ¼ mile of wetland riparian areas and perennial streams to surface-disturbing activities to reduce channel and bank erosion and sediment loading. Alternative B restrictions on surface-disturbing activities and the prohibition of discharging produced waters to streams are expected to result in the least adverse impacts to Class 1 and 2 streams relative to Alternative A and other action alternatives. In addition, Alternative B has the least amount of acreage suitable for wind-energy development of all alternatives.

Under this alternative, the Dry Fork, Upper Tributary, and Lower Tributary watersheds are designated ACECs to protect special status fish species (see Special Status Species – Fish section of this chapter). These designations generally result in greater beneficial impacts on water quality in those areas than Alternative A, which does not designate these areas as ACECs. Alternative B recommends the 13 eligible waterways for inclusion in the national wild and scenic rivers system, an action anticipated to improve water quality and, thus, beneficially impact fisheries in the planning area.

Adverse impacts to water quality from OHV use are expected to be less under Alternative B than under Alternative A. Alternative B provides more effective management of motorized use to sensitive areas and decreases environmental impacts from motor vehicle use compared to Alternative A. Alternative B includes a greater degree of improved management directed at protecting erosive soils than Alternative A. With the most area closed to OHV use and the most area with seasonal closures for OHV use, Alternative B is anticipated to result in the least adverse impacts to water quality compared to Alternative A and the other action alternatives. Alternative B has more stringent requirements to protect soils from surface-disturbing activities resulting in fewer opportunities for soil erosion and sedimentation. The restrictions on surface-disturbing activities under Alternative B, along with proposed actions to manage for late successional stage riparian vegetation, reduce adverse impacts to water quality and fish habitats compared to Alternative A and benefit fisheries in the planning area.

Water Quantity Impacts

Alternative B results in the least amount of change to surface water quantity because the fewest federal wells are drilled (503 wells), disposal of produced waters to streams is prohibited, and more restrictions on surface-disturbing activities are implemented than under Alternative A or the other action alternatives. Alternative B's management of human-caused barriers to fish movement, including, but not limited to irrigation diversions, road crossings, and damaged culverts, results in greater beneficial impacts to fish species than Alternative A by providing for genetic diversity and population stability.

Alternative C

Water Quality Impacts

Alternative C has the most potential of all alternatives to degrade water quality through increased sedimentation due to having the least restrictions on surface-disturbing activities. Alternative C is expected to produce the second greatest amount of short-term surface disturbance of all alternatives. Alternative C opens the most acres and closes the least acres to OHV use and has the second-most acres administratively available to mineral leasing with standard stipulations. In addition, Alternative C has the greatest acreage suitable for wind-energy development. Alternative C's proposed restrictions and reclamation requirements are anticipated to result in similar adverse impacts to water quality as Alternative A.

Alternative C does not designate any areas as ACECs to protect fisheries habitats and removes the Raymond Mountain ACEC. The lack of specific protections for watersheds results in similar beneficial impacts to fisheries habitats as Alternative A.

Water Quantity Impacts

Alternative C results in a similar, but slightly greater amount of change to surface water quantity because the most federal wells are drilled (1,020 wells) and disposal of produced water is allowed providing it meets local, state, and federal laws and regulations, similar to Alternative A. Disposal options for produced water from oil and gas wells include containment, enhanced infiltration, reinjection, or surface disposal. Disposal of produced water to surface waters could affect surface water quantity; however, there are currently no surface disposals of produced water to surface waters within the Kemmerer planning area (Roberts 2006).

Under Alternative C, impacts from CBNG wells and other oil and gas wells are similar to Alternative A. Human-caused barriers to fish movement are managed similar to Alternative A, resulting in similar impacts.

Alternative D (Proposed RMP)

Water Quality Impacts

Alternative D has the second lowest acreage administratively available to mineral leasing with standard stipulations and the highest acreage administratively available with moderate constraints. OHV use restrictions are similar to those described under Alternative B, but a larger area (159 acres) is open to OHV use under Alternative D, so the potential for surface disturbance and sedimentation from OHV use is slightly greater. Alternative D implements restrictions similar to Alternative B, but greater than Alternative A, to protect water quality, including designing surface-disturbing activities to reduce channel and bank erosion and sediment loading. However, Alternative D results in the second highest acreage suitable for wind-energy development. The anticipated adverse impacts to water quality for Alternative D are anticipated to be less than Alternative A, but greater than Alternative B.

Alternative D retains the Raymond Mountain ACEC and recommends two waterways, Huff Creek and Raymond Creek, for inclusion in the national wild and scenic rivers system. These designations may benefit fisheries in general and provide more management direction to protect existing resource values than Alternative A. This type of management results in greater beneficial impacts to fisheries habitats than Alternative A.

Water Quantity Impacts

Although the number of federal wells (1,010 wells) drilled under Alternative D is similar to Alternative A (1,012 wells), Alternative D results in fewer adverse impacts to fish habitats because Alternative D implements more restrictions by requiring a BLM-approved produced water disposal plan. Impacts to fish species based on management of human-caused barriers to fish movement under Alternative D are the same as Alternative B.

4.4.4.3 Conclusion

Alternatives A and C have the greatest potential of adverse impacts to fisheries because these alternatives have the largest areas administratively available to mineral development and the least restrictions on surface-disturbing activities. Alternative B results in the least potential adverse impacts to fisheries habitats due to more restrictions on surface-disturbing activities. Compared to Alternative A, limitations on surface disturbance and mineral development under Alternative B potentially lessen degradation of water quality. Alternatives B and D provide more effective management of motorized use in sensitive areas and decrease environmental impacts from motor vehicle use. Alternatives A and C have the greatest potential for user conflicts and degradation of natural resources. The designation of three ACECs under Alternative B to protect special status fish species is anticipated to have greater beneficial impacts to fisheries habitats than any other alternative.

4.4.5 Fish and Wildlife Resources – Wildlife

Actions that remove, degrade, or fragment wildlife habitat are considered adverse. Beneficial impacts include actions that conserve or improve habitats, such as big game crucial winter range, nest sites, or leks.

Direct impacts to wildlife could result from the loss of habitats or key habitat features, such as a nest site or lek area, or from the immediate loss of life. Wildlife also can be directly disturbed by human activities, potentially causing wildlife to abandon a nest, lek, or home range. Disturbance during sensitive periods (e.g., winter, nesting) is known to adversely impact wildlife. Human activities, such as OHV use, recreation, and noise from equipment associated with development and surface-disturbing activities, impact some wildlife species. These activities are considered to be particularly detrimental to nesting and lekking grouse, nesting raptors, and wintering big game. Disturbance impacts range from short-term displacement and shifts in activities to long-term abandonment of home range (Yarmaloy et al. 1988; Miller et al. 1998; Connelly et al. 2000).

Habitats can be lost and fragmented by activities such as vegetation treatments; fire and fuels management; mineral exploration and extraction; construction and maintenance of roads and trails; and development of wind-energy facilities. Indirect impacts to wildlife can occur by changing habitat characteristics or quality. Habitat quality can be impacted by various surface-disturbing activities and other actions that remove vegetation and disturb soil. Indirect impacts to wildlife habitats also could occur when specific actions change the habitats in a way that would make it unsuitable for future habitation. Human disturbance from vehicular travel on roads, human activity at drill sites or wellheads, or any other activity not associated with the natural environment (including noise from generators) can indirectly impact wildlife not accustomed to it. Two species especially sensitive to human activity and noise include greater sage-grouse on lek sites and elk.

For the purpose of this analysis, short-term impacts to wildlife are activities that an individual or species respond to immediately, but do not affect the population viability of the species. For example, many disturbance impacts are short term in that a species may temporarily abandon an area, nest, or lek, but return immediately following the cessation of the disturbance, such as a passing OHV. Short-term construction may cause an animal to abandon an area, nest, or lek, but the species is often able to return to

the area and reproduce successfully the following season. Refer to Map 21 for vegetation and to Map 22 for crucial big game winter range.

4.4.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- BLM, in cooperation with state and other federal wildlife agencies, is responsible for managing habitat (e.g., quality, suitability, usability), whereas state and federal wildlife management agencies (e.g., WGFD, USFWS) have primary authority for overseeing management of wildlife populations. Therefore, this analysis primarily relies on vegetation changes and loss of habitat use due to disruptive activities to estimate impacts to wildlife habitats.
- For each alternative, changes to vegetation types, in either quantity, quality, or increased fragmentation, are compared to baseline conditions. Adverse and beneficial impacts to vegetation types (i.e., wildlife habitats) are assumed to have a corresponding adverse or beneficial impact on wildlife species.
- Disturbance impacts to wildlife are evaluated by comparison to current management practices in the planning area; increased protection in time or space is beneficial, while reduced protection has adverse impacts.
- High-quality habitats foster healthy, abundant, and biological communities appropriate to those habitats.
- Human activity that disturbs wildlife during sensitive periods causes adverse impacts.
- Habitat fragmentation adversely impacts many desired species of wildlife.
- Impact-acre estimates are based on the best, currently available information.
- Management actions aimed to benefit specific wildlife species can have adverse or beneficial impacts on other wildlife species.
- Generally, the more acreage of habitat protected from fragmentation, the greater the benefit to big game and other desirable wildlife species.
- "Prohibit" means specified activities or impacts to wildlife during identified periods or in designated habitat areas would not occur unless specific biological exception criteria are met.
- Surface disturbance generally causes adverse impacts to desired wildlife habitats. Lesser amounts of surface disturbance in wildlife habitats have a corresponding lesser adverse impact to wildlife compared to more surface-disturbing activities.
- When surface disturbance is later reclaimed, it is accounted for in surface-disturbance acreage in Appendix M.
- Prohibiting surface disturbance or occupancy is more restrictive and provides more protection than avoiding surface disturbance or occupancy.
- Concerning the analysis of impacts on raptor nests, all known nests from the BLM's GIS database are used in the analysis and all raptor nests of unknown species are assumed to not be special status species.
- The exact locations of future surface-disturbing activities cannot be predicted. Therefore, for analysis purposes, surface-disturbing activities are assumed to occur in vegetation types in proportion to their availability within the planning area. Impact acreage for vegetation types are not absolute, but serve as a relative comparison among alternatives.

- The BLM utilizes best available information, management and conservation plans, and other research and related directives, as appropriate, to guide wildlife habitat management on BLM-administered lands.

4.4.5.2 Analysis of Alternatives

Allowable uses and management actions that could impact wildlife habitats include all surface-disturbing activities, concentrated livestock grazing, fire and fuels management, forest management, INNS, OHV use, recreation, transportation, and proactive management actions.

Impacts Common to All Alternatives

The impacts projected to occur to wildlife as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to wildlife from surface-disturbing activities, concentrated livestock grazing, fire and fuels management, forest management, INNS, OHV use, recreation, transportation, and proactive management actions are described under individual alternatives. For organization purposes, impacts to wildlife from alternatives generally are grouped into categories of surface-disturbing activities, wildlife-disturbing activities that remove vegetation and disturb soil, spread of INNS, transportation, and proactive management actions anticipated to impact wildlife. The impacts described for each alternative are organized according to the statutory wildlife categories described in the Fish and Wildlife Resources – Wildlife section in Chapter 3.

Refer to Table 4-1 for the anticipated short- and long-term surface disturbance acreages from BLM actions in the planning area over the life of the plan. RFAs contributing to this surface disturbance are identified in Appendix M. Because the precise location of foreseeable actions in the planning area is not known at this time, Table 4-1 and associated types of development were used to estimate the relative impact of alternatives on statutory categories of wildlife.

Animal damage control typically applies to coyote, red fox, and skunk. No difference in adverse impacts to predatory animals is anticipated across alternatives.

Potential impacts to wildlife species are anticipated from surface-disturbing activities, wildlife-disturbing activities (i.e., those activities that remove vegetation and disturb soil and [or] human activities that result in disturbance because of presence), spread of INNS, and proactive management actions. Although lumped for discussion purposes under surface disturbance, energy development is anticipated to be the greatest single contributor to disturbance of wildlife habitat in the planning area. Beyond initial exploration, land clearing, and permanent above-ground structure and facility construction, continued human disturbance to wildlife can occur from activities such as equipment maintenance, especially disruptive to wildlife during winter. The WGFD (2004a) provides a more thorough discussion of the impacts of oil and gas development on crucial and important wildlife habitats. At various intensities, the actions of all alternatives could adversely impact wildlife through the loss, degradation, and fragmentation of habitats, and benefit wildlife through the protection, enhancement, and restoration of habitats. Potential impacts from each category of activities are described below as they apply to all alternatives and to all statutory wildlife categories.

Surface-disturbing Activities. Because the precise location of surface disturbance from alternatives is unknown and because wildlife species utilize more than one vegetation type, the degrees of impacts to wildlife from surface disturbance are anticipated to be directly related to the amount of surface disturbance. Long-term acreage calculations account for those areas where reclamation practices have not been completed in order for the placement of facilities, temporary or permanent (e.g., roads, well pads, wind turbines, etc.), in order to stabilize unnecessary portions of the disturbance. The goal of this reclamation is to improve soil stability, and soil health. An additional benefit is that it may provide

forage for livestock and some wildlife species. However, long term impacts to some species that require specific habitat types (i.e. sage obligates) may occur throughout the life of the facilities and for years after the facility removal. The higher the density of permanent facilities in an area, the more a habitat is fragmented and the more adverse impact anticipated for wildlife (Weller et al. 2002). Table 4-9 summarizes select conservation measures anticipated to offset some of the impacts to habitats.

In addition to temporarily or permanently removing wildlife habitats, surface disturbance can degrade the quality of adjacent habitats. For example, erosion and runoff from surface disturbance can extend onto adjacent habitats, thereby causing additional soil erosion. Moreover, dust from surface disturbance can cover adjacent vegetation, thereby reducing photosynthesis and (or) the palatability of vegetation. Depending on the intensity of degradation, season, and the health conditions of wildlife using the habitats, reductions in habitat quality can have short- and long-term impacts to wildlife. For example, Towry (1984) indicates that deficiencies in summer range-habitat quality can lead to mortality of wildlife in the winter and reduce reproductive success in mule deer.

Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife

Actions Affecting Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Proposed RMP)
Raptors – ½-mile buffer	BLM-Administered Surface	3,769	0	3,769	0
	BLM-Administered Mineral Estate	3,065	0	3,065	0
Raptors – ¾-mile buffer	BLM-Administered Surface	37,689	0	37,689	37,689
	BLM-Administered Mineral Estate	40,878	0	40,878	40,878
Raptors – 1-mile buffer	BLM-Administered Surface	74,599	0	74,599	74,599
	BLM-Administered Mineral Estate	71,531	0	71,531	71,531
Raptors – 1½-mile buffer	BLM-Administered Surface	0	245,978	0	0
	BLM-Administered Mineral Estate	0	249,154	0	0
Acres Closed to Motorized Vehicle Travel	BLM-Administered Surface	32,787	33,896	32,787	33,037
Acres Open to Motorized Vehicle Travel	BLM-Administered Surface	0	0	2,791	159
Acres with Seasonal Closures for Motorized Vehicle Travel	BLM-Administered Surface	287,160	599,175	0	287,160
Vegetation Management	BLM-Administered Surface	Complies with ESA and BLM policy	Maintains large blocks of mountain scrub, aspen, and sagebrush communities	Same as Alternative A	Same as Alternative B

Table 4-9. Summary of Select Conservation Measures and Potential Habitat Impacts for Wildlife *(Continued)*

Actions Affecting Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Proposed RMP)
Habitat Fragmentation	BLM-Administered Surface	NA	Avoided to no more than 3 percent of available habitats	Avoided	Avoided
Migration Corridors	BLM-Administered Surface	NA	Identify and preserve	Identify and develop management	Identify and collaboratively develop management
Use of certified weed-free forage and feeds	BLM-Administered Surface	NA	Required	Recommended	Required
Use of certified weed-free seed and mulch	BLM-Administered Surface	NA	Required	Recommended	Required
Acres of forestland and woodland treated annually	BLM-Administered Surface	NA/NA	50/50	150/100	75/75
Big Game Crucial Winter Range Closure	BLM-Administered Surface	January 1 to April 30 in Slate Creek, Rock Creek, and Bridger Creek	November 15 to April 30 annually	None	Same as Alternative A

BLM Bureau of Land Management
ESA Endangered Species Act
NA not applicable

Habitat reclamation success is influenced by soil types, timing of revegetation activities, species of vegetation used, slopes, competition form INNS, and weather during the reclamation period. Surface-disturbing actions typically require BMPs to avoid or minimize impacts to soil resources and, ultimately, to habitats. Temporary protective surface treatments can benefit reclamation of habitats on steep slopes or on soils with high potentials for water or wind erosion because these areas are more difficult and often take more time to reclaim compared to other areas. Once surface disturbance occurs, the goal of interim reclamation is to avoid or minimize soil erosion and the spread of INNS. The longer reclamation takes, the greater the adverse impact is to habitats and wildlife species (refer to the Soil and Vegetation sections for more details).

Management of runoff from roads and other impervious surfaces or disturbed areas is an example of impacts from surface disturbance that can be short-term and long-term. Multiple disturbances on steep slopes or highly erosive soils are anticipated to exacerbate habitat degradation by soil erosion and runoff into wildlife habitats. This also may reduce reclamation potential to restore the habitats.

Vegetation treatments, such as silviculture, are used to manage forests that can, in turn, impact wildlife habitats. McAninch et al. (1984) observe that forest clear-cuts alter wildlife habitats more than other silviculture treatments because they set back plant succession to an early stage, disturb soil, alter microclimatic conditions, and completely remove forest habitats.

Roads remove vegetation and disturb soil when they are constructed and thereafter. Forman et al. (2003) identify mortality, habitat loss, and reduced habitat connectivity as the three impacts roads have on wildlife. Mortality of wildlife and loss of habitats due to road construction are direct impacts; vehicle speed and traffic volume have generally increased the mortality of wildlife due to vehicle collisions (Forman et al. 2003).

Road construction also causes habitat loss by converting wildlife habitats to permanent road surfaces and ROW (Forman et al. 2003). In addition, because roads typically are void of vegetation and exhibit impervious surface or compacted soil, they often promote increased surface runoff and lead to soil erosion and transport of pollutants to nearby streams, wetlands, or riparian areas.

In addition to direct impacts, roads also contribute to habitat fragmentation and can establish barriers to some wildlife species. For example, Towry (1984) indicates that roads generally decrease habitat quality for mule deer for a distance of ½ mile on either side of the road. Forman et al. (2003) acknowledge that buffer areas around roads generally are avoided by ungulates and large carnivores. Forman et al. (2003) also identify two wildlife responses to roads and their associated disturbances: numerical responses and behavioral responses. Numerical responses pertain to reductions in wildlife abundance or density; behavioral responses pertain to wildlife that has learned to avoid roads. Sawyer et al. (2007) states that during winter months, elk have the highest probability of using habitat that is 0.75 mile from roads. Sawyer et al. (2007)concluded that road density in nonforested areas significantly influences both summer and winter habitat use of elk. In addition to roads, ROW and corridors occur in the planning area under all alternatives and impact wildlife in varying ways. For example, utility poles benefit raptors and other birds by providing perching or nesting structures; however, these same utility structures also can cause mortality in raptors through electrocution and collisions (USFWS 2002). These utility structures also can be a detriment to raptor prey species because they provide a place from which raptors can hunt that gives them an unnatural advantage over sage steppe species that evolved in open habitats devoid of such structures. In addition to raptors, other species, such as ravens, crows, magpies, small flocking birds, and wading birds, are subject to electrocution by utility structures (USFWS 2002). Erecting artificial nest platforms on utility structures may benefit birds, such as osprey, eagles, and hawks, and nest boxes constructed on utility structures may benefit cavity-nesting birds (e.g., bluebirds) and bats (USFWS 2002). However, these structures also can have an unnatural adverse impact to potential prey species.

Wildlife-disturbing Activities. Planned and unplanned wildland fire removes vegetation and disturbs soils. Although wildland fire adversely impacts certain desirable wildlife habitats in the short term by removing vegetation and disturbing soil, the long-term benefits of wildland fire often outweigh the short-term adverse impacts. For example, prescribed fire can be used to restore conditions benefiting wildlife species favoring early plant succession stages and young age classes of woody plants (McAninch et al. 1984). Wallmo (1980) suggests that fire improves the palatability of forage and causes browse plants to resprout close to the ground, putting the current season's growth within reach of deer for several years.

Fire suppression removes vegetation and disturbs soil, and can have both short- and long-term impacts to big game and other habitats. For example, using heavy equipment to construct fire lines can cause habitat loss, degradation, and fragmentation in the short term. Moreover, if not rehabilitated, these fire lines can cause erosion and provide opportunities for the spread of INNS, thereby resulting in long-term adverse impacts to certain desirable wildlife habitats. Timely stabilization and rehabilitation following fire, therefore, is important to maintaining the quality of wildlife habitats.

Wildland fire has beneficial and adverse impacts to wildlife habitats. For example, fuels tend to build under repeated fire suppression, sometimes resulting in intense wildland fires that can cause long-term adverse impacts to certain desirable wildlife habitats. Repeated fire suppression in forests also can result in encroachment of fire-induced wildlife habitats (Wishart 1980). On the other hand, wildland fire can improve the quality of certain desirable wildlife habitats by releasing soil nutrients, reducing fuel load, or setting back trees encroaching into shrubland or grassland habitats. Preparing wildland fire use plans and coordinating with adjacent landowners prior to prescribed or wildland fires can provide opportunities for taking advantage of the benefits wildland fire can provide to certain desirable wildlife habitats.

OHV use is another wildlife-disturbing activity, which, through removal of vegetation, disturbance of soil, and transport of INNS, can degrade wildlife habitats. In addition to direct impacts of vegetation removal and soil disturbance, the disturbance to wildlife associated with OHV use includes the movement and noise from vehicles and riders. In addition to OHV use, construction, mineral exploration and extraction, recreation, and vehicles traveling on roads can cause noise that adversely impacts wildlife by increasing stress, poaching, and direct mortality (e.g., animal-vehicle collisions).

Some species of wildlife are more sensitive to noise and disturbance than other species, while other species habituate to types of noise or disturbance. Sage-grouse males and females have been shown to avoid areas with the most natural gas development activity and some chose nest sites differently in disturbed areas (Holloran 2005b; Lyon 2000; Lyon and Anderson 2003). In addition, Bowles (1995) indicates that wildlife can abandon habitats or expend energy as a result of disturbance and can continue to exhibit a response even when they have adapted to the disturbance. Depending on the intensity and frequency of occurrence of the disturbance, incurring energetic expense due to human disturbance during critical periods (e.g., winter) can impact wildlife survival and productivity. USFWS (2002) identifies courtship, nest construction, incubation, and early brooding as higher risk periods in the life-cycles of raptors when adults are more prone to abandoning nests due to disturbance. USFWS (2002) also indicates that human activities resulting in disturbance to raptors can cause raptor population declines. In general, the more area that is subject to noise and human-disturbing activities, such as intense OHV use, or the higher the density of these activities, the more disturbance and adverse impacts to wildlife habitats are anticipated. Avoidance of disruptive activities in big game crucial winter range from November 15 to April 30 across all alternatives would decrease adverse impacts to these species, including noise disturbance. Also, all alternatives avoid disruptive activity in elk calving areas from May 1 through June 30.

Livestock grazing may disrupt wildlife by changing habitat through removal of vegetation, disturbance and compaction of soil, and transport of INNS if improperly managed. Transport of INNS and concentrated livestock use at water sources and riparian areas have the most potential to produce detrimental impacts to wildlife habitats. Proper management of livestock grazing, deferring grazing on pastures exposed to wildland fire, monitoring forage utilization, and managing allotments to healthy rangeland standards can minimize adverse impacts to wildlife. Proper livestock grazing management also may enhance some wildlife habitats by reducing buildup of decadent vegetation and removing INNS.

The spread of INNS contributes to loss of certain desirable wildlife habitats, increased soil erosion, reduced water quantity and quality, and reduced structural and species diversity. Controlling the spread of INNS is necessary to maintain the carrying capacity of wildlife habitats. Comprehensive management plans, including controlling and monitoring the spread of INNS, are anticipated to be effective in reducing the adverse impacts of INNS. Targeting and eradicating INNS particularly detrimental to certain wildlife habitats are anticipated to benefit wildlife. For example, salt cedar is an INNS often found adjacent to or within water courses, wetlands, and riparian areas—habitats that are important to numerous wildlife species. If the spread of INNS in the planning area continues, adverse impacts to wildlife habitats are anticipated to be commensurate with the amount of wildlife habitats affected.

Proactive Management Actions. All alternatives implement protections for nesting raptors in the planning area. The timeframe and buffer distance for potential surface-disturbing activities around raptor nests varies by alternative.

Habitat fragmentation is a condition resulting from actions dissecting and isolating habitats. All alternatives protect wildlife habitats to some degree. Developing ROW and corridors, roads, fences, wind energy, minerals, recreational facilities, and urban areas all contribute to habitat fragmentation. The

impacts of fragmentation include, but are not limited to, reduction in biological diversity, habitat isolation, impediments to movement, and, in some cases, mortality.

The BLM currently tracks disturbance in crucial wildlife habitat as part of the oil and gas inspection and enforcement program using data from a variety of sources, including industry. The BLM anticipates using similar methods to track future disturbance and to credit reclaimed habitat as appropriate.

Management actions and allowable uses that protect surface water from impacts associated with soil erosion and pollutants are anticipated to benefit wildlife habitats. In arid climates, such as the planning area, the distribution and quality of water are important factors in the distribution and health of wildlife.

Wildlife species that use water sources and riparian and wetland habitats benefit from management actions common to all alternatives that promote protecting, developing, restoring, and improving water sources. For example, all alternatives protect wetlands, streams, and floodplains from surface-disturbing activities. The distance from these areas in which surface-disturbing activities cannot occur varies by alternative.

All alternatives will retain the existing boundaries for the Raymond Mountain WSA. In addition, this area is managed in compliance with the Interim Management Policy under all alternatives until the U.S. Congress determines its wilderness designation.

Alternative A

Potential impacts to statutory wildlife categories are described in this section in relation to the allowable uses and management actions comprising Alternative A and in the context of the types of impacts described in Impacts Common to All Alternatives earlier in this section.

Surface-disturbing Activities. Alternative A requires the BLM to comply with current standard practices for surface-disturbing activities and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Alternative A also implements an NSO restriction for fluid minerals on slopes greater than 40 percent, while restricting oil and gas activities on slopes greater than 25 percent. Alternative A implements controls for herbicide type and application in riparian areas to reduce the spread of INNS, but does not address the use of certified weed-free forage, feeds, seed, and mulch. These restrictions would benefit wildlife habitats.

Wildlife-disturbing Activities. Alternative A uses prescribed fire to manipulate vegetation to improve plant community health and meet resource objectives. Under Alternative A, fire management plans utilize AMR for wildland fire suppression. Use of wildland fire offers the opportunity to treat vegetation for the benefit of wildlife and other resource programs and to reduce hazardous fuels.

Alternative A limits soil disturbance from heavy equipment during fire suppression. Reclamation of surface disturbance begins within 1 year of the end of operations, and reestablishment of vegetation cover, usually grass and forb species, should occur within 3 years of initial seeding. Stabilization and rehabilitation standards in the DOI *Interagency Burned Area Emergency Response Guidebook* and the *BLM Burned Area Emergency Stabilization and Rehabilitation Handbook* may be implemented after wildland fires to sustain healthy ecosystems. In general, fire-suppression activities and stabilization and rehabilitation post wildland fire are anticipated to have adverse and beneficial impacts to wildlife habitats under Alternative A.

Alternative A closes the least acreage to OHV use, potentially leading to disturbance of wildlife. However, Alternative A has the second greatest acreage seasonally closed to OHV use, reducing adverse impacts to wildlife during crucial time periods. These closures also may reduce noise impacts to wildlife.

Alternative A does not require or recommend the use of certified weed-free forage, feeds, seed, or mulch. Lack of these actions could increase the spread of INNS, degrading certain desirable wildlife habitats and adversely impacting wildlife who depend on these habitats.

Proactive Management Actions. Alternative A includes proactive management actions anticipated to benefit wildlife within the planning area. For example, Alternative A manages forestlands to meet public demand, but sale quantity does not exceed annual sustained yield of the forestlands. Forestlands are perpetuated and increased as they are treated. In general, forest management and silviculture treatments under Alternative A are anticipated to have adverse and beneficial impacts to wildlife. Alternative A preserves, protects, and restores natural functions to riparian areas. Forestlands and riparian areas are used by wildlife, and improvements to these communities within the planning area are anticipated to benefit wildlife.

Under Alternative A, existing roads and trails are open for motorized vehicle use outside the Raymond Mountain WSA. However, to minimize stress to wintering animals, seasonal closures are implemented from January 1 to April 30 within the Slate Creek, Dempsey Creek, and Bridger Creek big game crucial winter range areas (see Map 46). Although exceptions can be granted, this management action is anticipated to benefit big game and other species utilizing these habitats during winter. By applying BLM fencing standards to newly constructed fences, no new BLM-controlled fence barriers would occur; however, most existing problems with fences would remain within 10 years.

As developing resources and resource use increases in the planning area, continued habitat fragmentation—a detriment to big game and other wildlife—is anticipated. Alternative A does not specifically identify proactive management actions to avoid or minimize the adverse impacts from habitat fragmentation.

Alternative A does provide some protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions by implementing an NSO restriction for fluid minerals on slopes greater than 40 percent and avoiding surface-disturbing activities within 500 feet of or within 100-year floodplains, wetlands, riparian areas, and aquatic habitats. In addition, Alternative A does not allow new permanent facilities within the 100-year floodplains unless they benefit the function of the area. Alternative A utilizes livestock grazing in the Mike Mathias Wetlands at Wheat Creek Meadows to enhance wildlife values in the area. These management actions are anticipated to benefit water quality and wetland and riparian areas.

Alternative A maintains the existing Raymond Mountain ACEC for special status species and riparian areas, but does not provide any additional special designations specifically to benefit wildlife. Based on the challenges and existing conditions, the impacts described under Impacts Common to All Alternatives, and the management actions and allowable uses described for Alternative A, impacts to populations in all statutory wildlife categories are expected to continue.

Big Game

The seasonal motorized vehicle closure, January 1 to April 30 of selected big game crucial winter range in the planning area (see Map 46) benefits big game by reducing stress to wintering animals. Alternative A does not identify large contiguous blocks of intact native vegetation in the planning area for protection from habitat fragmentation. Alternative A does not make specific decisions regarding areas suitable for wind-energy development. Alternative A does not have specific management actions addressing the use of certified weed-free seed, mulch, forage, or feeds to reduce the spread of INNS, which could adversely impact big game habitats. Alternative A does not identify specific management for migration corridors which could result in loss of access to winter ranges and lead to not meeting WGFD population objectives

for the impacted species. In western Wyoming, migration distances for mule deer and pronghorn are some of the longest recorded, and the identification and protection of migration corridors and bottlenecks may be necessary to maintain these populations (Sawyer et al. 2005). The management actions for Alternative A generally are expected to maintain existing conditions for big game in the planning area.

Trophy Game

Trophy game in the planning area include black bears and mountain lions. Although the WGFD manages black bear populations, maintaining a healthy black bear population depends on the habitat in which the black bear occurs. Black bears are impacted by management actions in forest and woodland habitats, which, generally, are not focused on providing habitats for black bears or mountain lions.

Mountain lions generally utilize similar habitats as mule deer—their primary prey. Russell (1978) indicates that the mountain lion's adaptability and wide distribution precludes designating much habitat as critical for this species; however, human encroachment into habitat supporting mountain lions and their prey reduce opportunities to manage this species. Although no specific management actions exist for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Furbearing animals include badger, beaver, bobcat, American marten, mink, and muskrat. No specific management actions for furbearing animals exist, but these species are impacted by other management actions. Indeed, Storm and Tzilkowski (1982) indicate that land use and habitat markedly influence populations of furbearing animals. Badger and bobcat are habitat generalists and, therefore, are impacted by actions in a variety of habitats. Impacts to various vegetation types can be found throughout this section.

The American marten is found in forests in the north and south portions of the planning area. American martens generally prefer older coniferous forest stands and aspen. Under Alternative A, no specific management actions aimed at maintaining late-successional forests and woodlands to benefit wildlife exist. BLM-administered lands in the northern portion of the planning area are limited.

Beaver, muskrat, and mink also can be found in association with aspen, but are always near wetland and riparian areas. Under Alternative A, the BLM preserves, protects, and restores natural function in riparian areas. Alternative A does not allow surface disturbance within 500 feet of riparian and wetland areas, benefiting beaver, muskrat, and mink. In addition, Alternative A allows permanent facilities in these areas only if they benefit watershed health or vegetation. These management actions will benefit beaver, muskrat, and mink habitat.

Predatory Animals

Predatory animals in the planning area include coyote, jackrabbit, porcupine, feral cat, red fox, raccoon, and striped skunk. The BLM does not conduct any specific habitat management activities for predatory animals. Regardless, predatory animals will be affected by BLM management actions for wildlife habitats. These animals are largely habitat generalists and, therefore, would be impacted by actions for a variety of habitat types. Impacts to various vegetation types can be found throughout this section.

Small Game

Small game includes the cottontail rabbit, snowshoe hare, red squirrel, and fox squirrel. No specific management actions for small game exist under Alternative A, but these species are impacted by other biological resource management actions. Habitat fragmentation is an issue for small game populations

because their populations tend to be especially disadvantaged by isolation (Temple 1985). Alternative A does not specifically address habitat fragmentation. Cottontail rabbits are habitat generalists and are impacted by a variety of actions in all habitat types. Snowshoe hare and red squirrel inhabit forests and woodlands. Impacts to these habitats are discussed under Nongame (Neotropical Migrants). Fox squirrels occur in riparian forests. Impacts to riparian areas also are discussed under Nongame (Neotropical Migrants).

Game Birds

The BLM (1992a) identifies modifying grazing, conducting prescribed fires, installing water developments, and building roost structures as methods for improving habitats for upland game birds. Ruffed grouse generally are associated with brushy riparian habitats within the conifer zone, and blue grouse generally are associated with upland conifer habitats. These habitat types occur in the northern and southern sections of the planning area. No specific management areas are designated for these species. In general, increased water availability and improvement to riparian habitats in the conifer zone are current management objectives for these species.

Migratory Game Birds

Although there are no specific management actions for migratory game birds, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats for waterfowl. Under Alternative A, the BLM manages wetland and riparian areas to preserve natural functions and implements buffers in these areas and within 100-year floodplains and perennial streams where surface disturbance should be avoided, benefiting migratory game birds. However, no management action exists to reduce channel erosion.

Nongame (Raptors)

The BLM (1992b) identifies declining habitat quantity and quality as the major causes of decreases in raptor populations. In the planning area, disturbance impacts to raptors are minimized by buffer zones around raptor nests. Under Alternative A, the BLM does not allow activity or surface disturbance for up to ¾ of a mile around raptor nests from February 1 through July 31; for peregrine falcons the restriction is extended through August 15. Alternative A protects approximately 116,057 acres around raptor nests. Protective buffers help to minimize, but cannot completely prevent, impacts to raptors because most species are highly mobile well beyond any buffers. Parrish et al. (1994) summarize field-tested mitigation techniques to reduce impacts to raptors and indicate the mitigation techniques most commonly used for raptors impacted by development have been to induce breeding raptor pairs to select a nest site away from development activities.

Wind-energy facilities can be a source of mortality for raptors because raptors can collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Wind-energy facilities also result in habitat loss and human disturbance through construction and maintenance of wind towers and associated facilities. Under Alternative A, no specific decision regarding wind-energy areas exists.

Nongame (Neotropical Migrants)

The BLM (1992c) states that viable nongame bird populations and biological diversity can be promoted by improving livestock management, prescribed fire, removal of INNS, seeding, and erosion control. These actions are managed under Alternative A; however, the spread of INNS is expected to continue under Alternative A.

All neotropical migrants could be adversely impacted by wind-energy facilities, as discussed for nongame raptors. Wind-energy facilities, as well as other linear features (e.g., roads, utility corridors), fragment habitat. Paton (1994) indicates that the success of many nongame bird nests declines near habitat edges.

Because of the diversity of bird species and habitat requirements, the descriptions of impacts are categorized under the following habitat guilds (note: a guild is a group of species that tend to occur in similar types of habitats): Forest and Woodland Species, Mountain Shrub Species, Sagebrush and Desert Shrub Species, Grassland Species, and Riparian and Wetland Species.

Forest and Woodland Species – No specific management actions exist under Alternative A to manage forests for neotropical migratory birds. BLM actions for silviculture treatments, forest products, and insect control result in short-term disturbance. Forestlands generally are managed to meet public demand. No management actions exist under Alternative A for management of old growth forest areas. Because of their diverse habitat requirements, some neotropical migrants are adversely impacted and some benefit from these management actions.

Mountain Shrub Species – Under Alternative A, no specific management actions exist for mountain shrub communities; however, Alternative A uses prescribed fire, wildland fire use, and chemical, mechanical, and biological treatments to improve plant community health. The long-term beneficial impacts from these treatments are expected to outweigh the short-term adverse impacts to neotropical migrants from the treatments themselves. Surface disturbances along the Bear River Divide could adversely impact the mountain shrub species.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed in the Special Status Species – Wildlife section in this chapter. Alternative A manages buffers around greater sage-grouse leks and nesting or early brood-rearing habitats. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from this restriction. Management actions for pygmy rabbits also may benefit neotropical migrants, although no management actions for pygmy rabbits occur under Alternative A.

Under Alternative A, no specific management actions exist for sagebrush or desert shrub communities. Management actions in sagebrush habitats could impact habitats for many neotropical migrants. Such actions include surface-disturbing activities, reclamation, control of INNS, and livestock and wildlife grazing. Surface-disturbing activities can result in habitat loss and fragmentation and reduce habitat quality. Alternative A does not provide specific guidance or management actions for the prevention of habitat fragmentation. Under Alternative A, the BLM continues to manage the grazing system and range improvements to achieve management objectives for livestock grazing, with an emphasis on category I allotments.

Grassland Species – Under Alternative A, there are no specific management actions for neotropical migrants that utilize grasslands. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Under Alternative A, grassland habitats could be impacted by long-term surface disturbance on BLM-administered land in the planning area; however, grasslands make up less than 1 percent of BLM-administered lands in the planning area.

Riparian and Wetland Species – Although there are no specific management actions for neotropical migrants that use riparian and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative A, the BLM manages to preserve, protect, and restore natural functions of riparian areas.

Alternative A implements a buffer area in riparian and wetland areas, aquatic habitats, and 100-year floodplains in which surface disturbance is avoided. Location of livestock supplements complies with all requirements. These management actions could benefit neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are affected by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are described above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Although bats also can utilize a variety of habitats, caves and abandoned mines are important features for most species. Bats that use caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Abandoned mine closures and recreational caving have been identified as the two major threats to bat habitats (Priday and Luce 1995). Priday and Luce (1999) refer to caves and abandoned mines as "crucial habitat" for some species of bats. As with other species in the planning area, water in close proximity to other habitat features is important to bats, especially maternity colonies (Priday and Luce 1995).

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. All bats could be adversely impacted by wind-energy facilities, as discussed for raptors.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians under Alternative A, these species are impacted by other biological resource management actions. Snakes occur in a variety of habitat types, while lizards typically occur in the drier habitats, particularly those with rock outcrops and cliffs. Aquatic turtles and amphibians require riparian and wetland habitats. The impacts of management actions on these habitat types are discussed throughout this section.

Alternative B

Potential impacts to statutory wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative B and in the context of the types of impacts described in Impacts Common to All Alternatives. Potential impacts to statutory wildlife categories from Alternative B are described relative to Alternative A.

Surface-disturbing Activities. Alternative B includes more restrictions regarding surface disturbance than Alternative A. For example, Alternative B prohibits surface-disturbing activities on excessively steep slopes of 10 percent or greater, as well as sensitive and highly erosive slopes. In addition, Alternative B prohibits surface disturbance on areas with poor topsoil. Alternative B implements stricter requirements for herbicide application and requires the use of certified weed-free seed and mulch. Once surface disturbance occurs, reclamation requirements under Alternative B are anticipated to reduce adverse impacts to wildlife habitats. The additional restrictions on surface disturbance and stricter reclamation requirements under Alternative B are anticipated to benefit wildlife habitats more than Alternative A.

Alternative B does not allow off-trail travel and closes riparian and wetland areas to OHV use. The Raymond Mountain WSA remains closed to mechanized vehicles. The closure of these areas is anticipated to benefit wildlife habitats by reducing habitat fragmentation and erosion and pollutant runoff

stemming from such roads and trails in these areas. OHV use under Alternative B is more restricted and, therefore, more beneficial to wildlife habitats. Overall, the tactical constraints, fuels management approach, stabilization and rehabilitation, and use of prescribed fire under Alternative B are anticipated to benefit certain desirable wildlife habitats more than Alternative A.

Wildlife-disturbing Activities. Alternative B allows natural ignitions in areas with wildland fire use plans to proceed to meet desired management objectives. Similar to Alternative A, Alternative B utilizes AMR for wildland fire suppression. Alternative B does not allow soil disturbance during suppression activities without the consent of the authorized officer.

Reestablishment of healthy native plant communities based on preexisting composition or other species as identified in an approved management plan would occur under this alternative. A reclamation plan will be developed and approved prior to any surface disturbing activities being authorized. Monitoring of reclamation success would begin during the first growing season after seeding. Performance standards will be based on site-specific objectives for reclamation and will be identified in the approved reclamation plan. Reclamation standards developed at the project level benefit wildlife habitats by managing actions specific to the area of disturbance. By reestablishing healthy native plant communities, Alternative B benefits wildlife more than Alternative A by maintaining native habitat types in the planning area, rather than just reestablishing vegetative cover on the site. Alternative B's requirement to use certified weed-free seed and mulch slows the potential spread of INNS more than Alternative A, resulting in greater beneficial impacts to wildlife in the planning area.

Alternative B closes the greatest acreage to OHV use, reducing disturbance of wildlife compared to Alternative A. Alternative B also closes the greatest acreage seasonally to OHV use, reducing adverse impacts to wildlife during crucial periods more than Alternative A. These closures also may reduce noise impacts to wildlife.

Alternative B requires the use of certified weed-free forage, feeds, seed, and mulch. These requirements could decrease the spread of INNS, preventing the degradation of certain desirable wildlife habitats and benefiting wildlife depending on these habitats.

Proactive Management Actions. Proactive management actions under Alternative B are anticipated to benefit wildlife through management of large, contiguous blocks of sagebrush, aspen, and mountain shrub communities and the connections among these communities under Alternative B, whereas Alternative A manages vegetation resources to comply with the ESA and BLM policy. Forest management under Alternative B benefits wildlife habitats. For example, Alternative B places limitations on the allowable sale quantities in forests and woodlands, manages 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA for healthy forest landscape objectives, and retains old growth forest areas. These actions promote species diversity, species vitality, and genetic diversity.

Alternative B closes all big game crucial winter range to motorized vehicles annually from November 15 to April 30, although exemptions apply. The benefits to big game and other wildlife under Alternative B are anticipated to be greater than under Alternative A because this closure would prevent disruption of wildlife during crucial time periods over a larger area for a longer period. In addition, Alternative B proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all wildlife categories described in this section. By removing or modifying all BLM fences to comply with current standards, no BLM-controlled fence barriers would exist within 10 years and most of the planning area would be barrier free within 10 years.

Alternative B provides more protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and other actions. For example, Alternative B closes areas within ¼ mile of perennial streams, riparian and wetland habitats, and 100-year floodplains. Similar to Alternative A, Alternative B does not allow new permanent facilities within the 100-year floodplain unless they benefit the function of the area. In addition, under Alternative B, the Mike Mathias Wetlands at Wheat Creek Meadows are not available for livestock grazing. These restrictions are anticipated to benefit water quality and wetland and riparian areas more than Alternative A.

The establishment and designation of MAs and ACECs for special status and wildlife species are anticipated to add restrictions to resource uses in these areas, thereby limiting human activities and associated habitat loss, degradation, and fragmentation. Overall, the designations under Alternative B are anticipated to benefit wildlife. Alternative B maintains the existing Raymond Mountain ACEC for special status plants and riparian areas, but also adds nine ACECs and two MAs. For example, Alternative B establishes the Rock Creek/Tunp and Bear River Divide MAs to benefit critical wildlife habitats. The benefit of establishing these MAs is anticipated to extend to all species in these areas. Alternative B also designates an ACEC for white-tailed prairie dogs that also would benefit other shrubland wildlife species.

Big Game

Alternative B reduces habitat loss and fragmentation due to restrictions on development that lessen the amount of disturbed surface and protect large contiguous blocks of land from fragmentation. Moreover, Alternative B restricts OHV use and livestock grazing in favor of wildlife habitats. Alternative B also utilizes forest management and fire and fuels management as tools to benefit certain desirable wildlife habitats. Alternative B identifies the least acreage as suitable for wind-energy development, limiting potential habitat fragmentation more than under Alternative A. Alternative B also more effectively controls the spread of INNS. Alternative B potentially results in the greatest beneficial impacts to big game of any alternative because it identifies and preserves migration corridors for big game. Preserving these migration corridors maintains access to these areas for big game and would have no adverse impacts on meeting WGFD population objectives for these species. There would be virtually no disturbance to big game in the migration corridors or on crucial winter ranges. The management actions under Alternative B are anticipated to result in greater beneficial impacts to big game than Alternative A.

Trophy Game

Management actions under Alternative B are anticipated to improve forestland and woodland habitats more than Alternative A, potentially providing improved habitat conditions that benefit black bears in the planning area. Impacts to mountain lions are anticipated to be similar to big game and big game habitats under Alternative B.

Furbearing Animals

Alternative B actions to promote old growth characteristics benefit the American marten. For example, Alternative B retains old growth forest areas and, where possible, retains connectivity of these areas. In addition, Alternative B maintains or enhances large, contiguous blocks of aspen habitat to minimize habitat fragmentation.

Alternative B manages all riparian areas toward mid-to-late successional stage vegetation benefiting riparian and wetland species, such as the beaver. Alternative B places greater restrictions on surface disturbance in riparian and wetland areas by not allowing this type of disturbance within ¼ mile of these areas and not allowing new permanent facilities in these areas. Alternative B actions protect and enhance riparian and wetland habitats through more restrictive management of livestock in these areas.

Management actions include making more areas not available for livestock grazing, including the Mike Mathias Wetlands at Wheat Creek Meadows; larger buffers around water sources, riparian areas, and aspen stands in which mineral supplements are placed; and excluding unallotted public lands with riparian areas to livestock grazing. These actions are anticipated to ultimately result in riparian systems with increased vegetation and structural diversity throughout the planning area, with benefits for beaver, muskrat, mink, and other riparian and wetland species.

Predatory Animals

Alternative B actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative B actions benefiting forestlands, woodlands, riparian areas, and other habitat types are anticipated to benefit the habitat generalist cottontail rabbit, as well as more habitat-specific species, such as the snowshoe hare, red squirrel, and fox squirrel.

Game Birds

Alternative B actions benefiting riparian habitats within the conifer zone and upland conifer habitats are anticipated to benefit ruffed grouse and blue grouse. Alternative B implements greater protection to riparian areas, benefiting game birds more than Alternative A. Overall, the habitat improvements and protections under Alternative B are greater than Alternative A.

Migratory Game Birds

Alternative B management actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds more than Alternative A. Under Alternative B, the BLM manages wetland and riparian areas to late successional stage vegetation. The buffer around wetlands, riparian areas, perennial streams, and 100-year floodplains where surface disturbance cannot occur is larger under Alternative B. These areas are closed rather than avoidance areas, benefiting migratory game birds more than Alternative A. In addition, Alternative B reduces channel erosion, bank erosion, and channel incision, and restores damaged wetlands.

Nongame (Raptors)

Restrictions around raptor nests are more extensive under Alternative B, since all buffers are 1½ miles, resulting in fewer direct impacts to nesting raptors. Seasonal restrictions vary based on the species of raptor (see Table 2-3). Wind-energy development under Alternative B is anticipated be less than any other alternative since this alternative identifies the least acreage suitable for this type of development in the planning area. Alternative B also manages sagebrush, aspen, and mountain shrub communities in large, contiguous blocks and maintains connections among these communities. In addition, Alternative B protects riparian areas, restricts livestock grazing, and increases control of INNS. These actions are anticipated to benefit birds and small mammals comprising raptor prey in the planning area.

Nongame (Neotropical Migrants)

Alternative B management actions pertaining to forest management; management of sagebrush, aspen, and mountain shrub communities; INNS control; habitat fragmentation; protection of water sources; and fire and fuels management are anticipated to benefit nongame neotropical migrants in the planning area. In addition, the raptor nest buffer (1½ miles) under Alternative B, would benefit all neotropical migrants within these buffer areas by resulting in fewer disturbances to all of the guilds during the crucial periods.

Forest and Woodland Species – Alternative B limits treatment areas on forests and woodlands and tries to restore structure and composition to more historical conditions. Treatments in the Raymond Mountain WSA are managed to simulate natural alteration of vegetation. Alternative B retains old growth forest areas in an appropriate proportion to other timber classes. Treatments of forests and woodlands may result in younger-aged areas. The anticipated mix of seral stages benefit a variety of neotropical migrants. In addition, Alternative B manages for large, contiguous blocks of aspen communities, benefiting neotropical migrants in this habitat.

Mountain Shrub Species – Under Alternative B, the BLM places an increased importance on mountain shrub communities by managing for large, contiguous blocks of mountain shrub communities, benefiting neotropical migrants in this habitat.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse, as described in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from these restrictions. Alternative B protects largersized buffers than Alternative A, thereby benefiting neotropical migrants more.

Alternative B provides more restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs. The area disturbed is smaller and reclamation of disturbed areas focuses on reestablishment of native plant communities; thereby, maintaining long-term habitat quality in all habitat types, including sagebrush. Alternative B seeks to minimize adverse impacts to sagebrush and other habitats from the spread of INNS by implementing a requirement to use certified weed-free seed and mulch. Furthermore, Alternative B manages grazing systems and range improvements to enhance watershed, riparian, and wildlife values. These management actions are anticipated to benefit sagebrush and desert shrub species more than Alternative A.

Grassland Species – Under Alternative B, grassland species benefit by more reclamation requirements, more INNS control, and more restrictions to livestock grazing. In addition, Alternative B actions limiting habitat fragmentation are anticipated to benefit grassland neotropical migrants.

Riparian and Wetland Species – Alternative B management actions that protect, enhance, and restore water and riparian and wetland habitats are anticipated to benefit neotropical migrants using these areas. For example, Alternative B manages all riparian areas for mid-to-late successional vegetation. Alternative B increases the buffer around these areas in which surface disturbance is prohibited compared to Alternative A, which avoids surface disturbance in these areas. Alternative B protects and enhances riparian and wetland areas by using grazing systems and range improvements to enhance these areas and wildlife values. These actions are anticipated to ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. Because wind-

energy development could occur on less acreage than Alternative A, impacts to bats under Alternative B are anticipated to be less than Alternative A.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative B. The impacts of management actions on these habitat types are discussed throughout this section.

Alternative C

Potential impacts to wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative C and in the context of the types of impacts described in the Impacts Common to All Alternatives section. Potential impacts to wildlife categories from Alternative C are described relative to Alternative A.

Surface-disturbing Activities. Alternative C includes similar restrictions regarding surface disturbance as Alternative A. For example, Alternative C allows surface-disturbing activities on poor topsoils and implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Alternative C has the greatest acreage identified as suitable for wind-energy development. Overall, surface-disturbing activities under Alternative C are anticipated to be similar to Alternative A.

Once surface disturbance occurs, reclamation requirements under Alternative C are anticipated to produce similar impacts to wildlife habitats as under Alternative A. Alternative C allows limited off-trail travel, offering more protection for habitat from OHV use than Alternative A. Similar to Alternative B, most of the Raymond Mountain WSA is closed to OHV use. The restrictions on surface disturbance under Alternative C are anticipated to result in impacts to wildlife habitat similar to Alternative A.

Wildlife-disturbing Activities. This alternative uses full protection strategies and suppresses all wildland fires throughout the planning area; however, it uses similar methods for INNS control as identified in Alternative A. Prescribed fire, wildland fire, and chemical, biological, and mechanical treatments are not used in Alternative C to meet fuels management objectives, reduce hazardous fuels, or reintroduce fire to its natural role in the ecosystem. Overall, the fire management approach under Alternative C is anticipated to have less beneficial and more adverse impacts to certain desirable wildlife habitats. Alternative C does not allow natural ignitions within areas with wildland fire use plans to proceed to meet desired management objectives. Instead, Alternative C suppresses all wildland fires and allows soil disturbance from suppression activities only if private or public habitable structures or industrial facilities are at risk.

Reclamation of surface disturbance is the same as described in Alternative A. Unlike Alternative A, Alternative C recommends the use of certified weed-free seed and mulch to slow the potential spread of INNS, resulting in greater beneficial impacts to wildlife in the planning area.

Alternative C closes the same acreage to OHV use as Alternative A, potentially leading to disturbance of wildlife. However, Alternative C has no seasonal closures for OHV use, potentially resulting in the greatest adverse impacts to wildlife during crucial periods. Lack of these closures also may increase adverse impacts from noise to wildlife.

Alternative C recommends the use of certified weed-free forage, feeds, seed, or mulch. If these products are used, the spread of INNS could decrease, similar to Alternative B; however, if these products are not used, the impacts to wildlife would be similar to Alternative A and could increase the spread of INNS, degrading certain desirable wildlife habitats and adversely impact wildlife depending on these habitats.

Proactive Management Actions. Alternative C includes proactive management actions anticipated to benefit wildlife within the planning area. For example, Alternative C treats forestlands and woodlands to reduce stocking levels and structure and composition to more historic conditions. Alternative C designates the largest probable allowable sale quantity of all alternatives. In general, forest management and silviculture treatments under Alternative C are anticipated to have adverse and beneficial impacts to wildlife. Alternative C manages riparian areas similar to Alternative A. Improvements to forestlands and riparian areas within the planning area are anticipated to benefit wildlife.

Under Alternative C, existing roads and trails are open for motorized vehicle use, including those in big game crucial winter range, potentially disrupting wildlife during stressful periods. This management action is anticipated to adversely impact big game. Alternative C provides more protection to wildlife habitats by avoiding habitat fragmentation than Alternative A; however, similar to Alternative A, Alternative C does not manage for large, contiguous blocks of native vegetation. Impacts associated with fences would be the same as described under Alternative A.

Alternative C does provide similar protection of surface water from impacts associated with soil erosion and runoff from disturbed areas and from other actions as under Alternative A. Alternative C opens the Mike Mathias Wetlands at Wheat Creek Meadows to livestock grazing, potentially adversely impacting wildlife habitats in the area. Ducks Unlimited (2004) indicates that concentrations of livestock around wetlands, especially in the summer, can have localized impacts on wetland habitats important to waterfowl.

Alternative C does not retain the existing Raymond Mountain ACEC for special status species and riparian areas and does not designate or establish any other ACECs or MAs. Based on the challenges and existing conditions, the impacts described under Impacts Common to All Alternatives, and the management actions and allowable uses described for Alternative C, impacts to populations in all statutory wildlife categories are expected to continue and be similar to Alternative A.

Big Game

Alternative C does not implement seasonal restrictions to motorized vehicle use for any big game crucial winter range. Alternative C has the greatest acreage suitable for wind-energy development, potentially disrupting wildlife more than all other alternatives. Although Alternative C does not identify large, contiguous blocks of intact native vegetation to protect from habitat fragmentation as under Alternative B, Alternative C does address and avoid habitat fragmentation more than Alternative A. Alternative C recommends the use of certified weed-free seed, mulch, forage, and feeds to reduce the spread of INNS. In addition, Alternative C identifies and develops management for big game migration and travel corridors and impacts would be slightly greater than those described for Alternative B, as limited disturbance in these areas could occur. Alternative C is anticipated to result in greater beneficial impacts to big game than Alternative A.

Trophy Game

Management actions for forest and woodland habitats under Alternative C are anticipated to result in the greater beneficial impacts to trophy game species than Alternative A. Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

While no specific management actions for American marten are included, Alternative C retains old growth forest areas in appropriate locations using an adaptive management approach in both coniferous and aspen communities. Although Alternative C allows the highest probable sale quantity, management of some areas as old growth will benefit the American marten more than Alternative A. Avoidance of habitat fragmentation in aspen communities also benefits American marten more than Alternative A.

Management of riparian areas under Alternative C is similar to Alternative A; however, Alternative C allows new permanent facilities in these areas if no other practicable locations exist and sufficient mitigation occurs. Restrictions to livestock grazing are similar to Alternative A; however, Alternative C opens the Mike Mathias Wetlands at Wheat Creek Meadows to livestock grazing. Management of livestock grazing under Alternative C focuses on maximizing livestock grazing while meeting standards and guidelines. Alternative C is anticipated to result in similar impacts to beaver, muskrat, and mink as Alternative A.

Predatory Animals

Alternative C actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative C actions benefiting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit and more habitat specific species, such as the snowshoe hare, red squirrel, and fox squirrel.

Game Birds

Alternative C actions benefiting riparian habitats within the conifer zone and upland conifer habitats are anticipated to benefit ruffed grouse and blue grouse. Beneficial impacts in riparian areas are anticipated to be similar to Alternative A.

Migratory Game Birds

For the most part, Alternative C actions pertaining to water, wetland, and riparian areas are similar to Alternative A, therefore resulting in similar impacts to migratory game birds. However, Alternative C reduces channel and bank erosion and channel incision similar to Alternative B, benefiting migratory game birds more than Alternative A.

Nongame (Raptors)

Alternative C restrictions around raptor nests are less than Alternative A because seasonal restrictions vary with species and nest buffers are smaller (see Table 2-3). Alternative C identifies the greatest acreage suitable for wind-energy development of all alternatives. Alternative C does not manage large, contiguous blocks of sagebrush, aspen, and mountain shrub communities. While the nesting buffers benefit raptors, Alternative C is anticipated to have similar beneficial impacts to raptors as Alternative A because of the similar potential wind-energy development.

Nongame (Neotropical Migrants)

Alternative C actions pertaining to forest management, INNS control, habitat fragmentation, and protection of water sources are anticipated to benefit nongame neotropical migrants in the planning area.

Forest and Woodland Species – Alternative C does not include specific management actions aimed at managing forests and woodlands to benefit wildlife; rather, Alternative C allows the greatest probable sale quantity. Alternative C retains old growth forest areas based on evaluations, using an adaptive management approach. Treatments in the Raymond Mountain WSA are similar to Alternative B. Alternative C does not manage for large, contiguous blocks of aspen communities, similar to Alternative A.

Mountain Shrub Species – Similar to Alternative A, Alternative C does not manage for large, contiguous blocks of mountain shrub communities.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitats benefit from management actions for greater sage-grouse as discussed in the Special Status Species – Wildlife section. Because the breeding season of the greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Buffer sizes under Alternative C are the same as those under Alternative A, thereby benefiting sagebrush and desert shrub neotropical migrants.

Potential surface disturbance under Alternative C is less than Alternative A, but greater than all other alternatives; however, reclamation under Alternative C is similar to Alternative A. Alternative C recommends the use of certified weed-free seed and mulch. Grazing systems and range improvements under Alternative C focus on maximizing livestock grazing while still meeting standards and guidelines. Alternative C is anticipated to have greater beneficial impacts to sagebrush habitats than Alternative A.

Grassland Species – Under Alternative C, grassland species benefit less due to fewer restrictions on livestock grazing. However, Alternative C actions limiting habitat fragmentation are anticipated to more often benefit grassland neotropical migrants.

Riparian and Wetland Species – Alternative C manages riparian and wetland areas similar to Alternative A. Livestock grazing is maximized while still meeting standards and guidelines. Alternative C also implements greater measures to reduce INNS than Alternative A. Alternative C is anticipated to result in similar impacts as Alternative A to neotropical migrants.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. Because from the acreage suitable for wind-energy development under Alternative C is greatest of all alternatives, , impacts to bats under Alternative C are anticipated to be greater than Alternative A.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative C. The impacts of management actions on these habitat types are discussed throughout this section.

Alternative D (Proposed RMP)

Potential impacts to statutory wildlife categories are described in this section in relation to the intensity of allowable uses and management actions comprising Alternative D and in the context of the types of impacts described in the Impacts Common to All Alternatives section. All potential impacts to wildlife categories from Alternative D are described relative to Alternative A.

Surface-disturbing Activities. Alternative D includes more restrictions regarding surface disturbance than Alternative A, but less compared to Alternative B. For example, Alternative D allows, but minimizes, surface disturbance on sensitive soils on slopes 20 percent or greater, protects the Green River and Bear River basins from increased erosion, and avoids disturbances on sensitive soils. Alternative D is similar to Alternative B in its reclamation requirements and is anticipated to reduce adverse impacts to wildlife habitats. Alternative D prohibits soil disturbance from suppression-related activities without consent of the authorized officer. Overall, the tactical constraints, fuel management approach, stabilization and rehabilitation, and use of prescribed fire under Alternative D are anticipated to benefit wildlife habitat more than Alternative A.

OHV use under Alternative D is more restricted and, therefore, more beneficial to wildlife habitats. Alternative D identifies developing travel management plans similar to Alternative C. Some closures of areas to motorized vehicles is anticipated to benefit wildlife habitats by reducing habitat fragmentation, erosion, and pollutant runoff coming from roads and trails.

Wildlife-disturbing Activities. Use of prescribed fire under Alternative D is anticipated to benefit wildlife habitats more than in Alternative A, since management objectives are based on thresholds. Alternative D allows the use of wildland fire to meet desired management objectives, which is anticipated to benefit certain desirable wildlife habitats.

Buffer distances around riparian and wetland areas for treatment of INNS are the same as Alternative A. Similar to Alternative B, Alternative D requires the use of certified weed-free seed, mulch, forage, and feeds to control the spread of INNS. Alternative D is anticipated to slow the spread of INNS within the planning area and thereby benefit certain desirable wildlife habitats.

Alternative D closes the second greatest acreage to OHV use, reducing disturbance of wildlife compared to Alternative A. Alternative D also closes the second greatest acreage seasonally to OHV use (similar to Alternative A), reducing adverse impacts to wildlife during crucial time periods more than Alternative C, but less than Alternative B. These closures also may reduce noise impacts to wildlife.

Alternative D requires the use of certified weed-free forage, feeds, seed, and mulch. These requirements would result in the same impacts to wildlife as Alternative B.

Proactive Management Actions. Proactive management actions under Alternative D are anticipated to benefit wildlife. Management of large contiguous blocks of sagebrush, aspen, and mountain shrub communities and the connections among these communities, similar to Alternative B, limit habitat fragmentation more than Alternative A. Forest management under Alternative D benefits wildlife habitats. For example, Alternative D places limitations on the allowable sale quantities in forests and woodlands, manages 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA for healthy forest landscape objectives, and retains old growth forest areas, similar to Alternative B. These actions promote species diversity, species vitality, and genetic diversity.

Alternative D closes the same three big game crucial winter ranges as under Alternative A to motorized vehicles annually from January 1 to April 30, although exemptions apply (see Map 49). The benefits to big game and other wildlife under Alternative D are anticipated to be similar to Alternative A. In

addition, Alternative D proposes a proactive management action to avoid or minimize the adverse impacts from habitat fragmentation. Minimizing the adverse impacts of habitat fragmentation is anticipated to benefit all wildlife categories described in this section. Under Alternative D, select BLM-controlled fence barriers would be eliminated and crucial habitats would mostly be barrier free within 10 years.

Alternative D provides similar protection to surface water from potential impacts associated with soil erosion and runoff from disturbed areas and other actions as Alternative A; however, Alternative D implements greater restrictions for placing new structures within the 100-year floodplain. Alternative D manages livestock grazing in the Mike Mathias Wetlands at Wheat Creek Meadows similar to Alternative A. These restrictions are anticipated to benefit water quality and wetland and riparian areas similar to Alternative A.

Alternative D maintains the existing Raymond Mountain ACEC for special status plants and riparian areas, but also adds two MAs that directly benefit wildlife habitats. For example, Alternative D establishes the Rock Creek/Tunp and Bear River Divide MAs to benefit critical wildlife habitats; however, the acreages for each of these MAs is smaller than that established under Alternative B. The benefit of establishing these MAs is anticipated to extend to all species in these areas.

Big Game

Alternative D limits adverse impacts on big game crucial winter range by seasonally closing select areas to motorized vehicles (see Map 49). Alternative D identifies more suitable areas for wind-energy development than Alternative B, but less than Alternative C. Alternative D limits habitat fragmentation similar to Alternative C, but manages large, contiguous blocks of sagebrush, aspen, and mountain shrubland similar to Alternative B. Also similar to Alternative B, Alternative D requires the use of certified weed-free mulch, seed, forage, and feeds to reduce the spread of INNS. Similar to Alternative C, Alternative D identifies and develops management for big game migration and travel corridors which would maintain most big game access to these areas. Some limited adverse impacts could occur, but would not likely result in failure to meet WGFD population objectives. The management actions for Alternative D are anticipated to result in beneficial impacts to big game, greater than those under Alternative A, but less than Alternative B.

Trophy Game

Management actions in forest and woodland habitats under Alternative D are anticipated to result in less adverse impacts to trophy game species than Alternative A. Mountain lions generally utilize similar habitats as mule deer—their primary prey. Although there are no specific management actions for mountain lions in the alternatives, mountain lions are impacted by management actions for mule deer and big game habitats.

Furbearing Animals

Alternative D actions to promote old growth characteristics and the impacts of these actions to American marten are similar to Alternative B. Alternative D specifies the acreage treated in forests and woodlands, which is less than Alternative C, but more than Alternative B. Also similar to Alternative B, Alternative D maintains or enhances large, contiguous blocks of aspen habitats to minimize habitat fragmentation.

Alternative D manages riparian areas for horizontal and vertical structure and composition to a successional stage appropriate for sensitive wildlife, which is anticipated to benefit other wildlife species in the area. Alternative D takes into account managing riparian areas for wildlife and livestock and to improve stream quality. Alternative D is anticipated to result in greater beneficial impacts than Alternative A to beaver, muskrat, mink, and other riparian and wetland species. Alternative D manages

the Mike Mathias Wetlands at Wheat Creek Meadow similar to Alternative A. In addition, Alternative D manages grazing systems and range improvements to achieve resource management objectives. Alternative D is anticipated to have greater beneficial impacts to furbearers in riparian and wetland areas than Alternative A.

Predatory Animals

Alternative D actions benefiting different vegetative types in the planning area are anticipated to benefit habitat generalists, such as predatory animals.

Small Game

Alternative D actions impacting forests, woodlands, riparian areas, and other habitat types utilized by small game are anticipated to benefit habitat generalists, such as the cottontail rabbit, and produce mixed results for more habitat-specific species, such as the snowshoe hare, red squirrel, and fox squirrel.

Game Birds

Alternative D actions benefiting riparian habitats within the conifer zone and upland conifer habitats are anticipated to benefit ruffed grouse and blue grouse. Beneficial impacts are anticipated to be greater than Alternative A.

Migratory Game Birds

Alternative D actions pertaining to water and riparian and wetland habitats are anticipated to benefit migratory game birds. Alternative D specifically manages both horizontal and vertical vegetative structure and composition in riparian areas. Similar to alternatives B and C, Alternative D reduces channel and bank erosion and channel incision, resulting in greater beneficial impacts to migratory game birds than Alternative A.

Nongame (Raptors)

Alternative D prohibits surface disturbance from February 1 to July 31 for all raptor nests except burrowing owl (April 15 to September 15, or whenever the young have fledged) and northern goshawk (April 1 to August 31). Buffer distances vary by species (see Table 2-3). Because Alternative A is a blanket restriction it may pose unnecessary restrictions on other resources, while Alternative D serves to reduce unnecessary restrictions while meeting species requirements for protection. Alternative D identifies the second greatest acreage suitable for wind-energy development, potentially resulting in the second greatest adverse impacts to raptors. Alternative D manages large, contiguous blocks of aspen, sagebrush, and mountain shrub communities similar to Alternative B, benefiting raptors and their prey species.

Nongame (Neotropical Migrants)

Alternative D actions pertaining to forest management; management of sagebrush, aspen, and mountain shrub communities; INNS control; habitat fragmentation; and protection of water sources are anticipated to impact nongame neotropical migrants in the planning area.

Forest and Woodland Species – Alternative D does not include specific management actions aimed at managing forests and woodlands to benefit wildlife; however, treatments in these areas are anticipated to benefit neotropical migrants in the long term. Management for old growth areas and large, contiguous blocks of aspen communities is similar to Alternative B.

Mountain Shrub Species – Similar to Alternative B, Alternative D manages for large, contiguous blocks of mountain shrub communities, benefiting the species utilizing this habitat.

Sagebrush and Desert Shrub Species – Species that utilize or depend on sagebrush habitat benefit from management actions for greater sage-grouse as described in the Special Status Species – Wildlife section. Because the breeding season of greater sage-grouse and neotropical migrants coincide, many species of neotropical migrants benefit from buffers around greater sage-grouse leks and nesting and early brood-rearing habitats. Alternative D protects the same size buffers around greater sage-grouse leks and the same-size buffers around nesting and early brood-rearing habitats, thereby resulting in similar benefits to sagebrush and desert shrub neotropical migrants.

Alternative D provides similar restrictions to minimize habitat loss and fragmentation in all habitat types, including sagebrush and desert shrubs, as discussed under Alternative B. The areas disturbed are greater under Alternative D, but reclamation of disturbed areas is similar to Alternative B. Grazing under Alternative D is designed to achieve management objectives and improves range conditions on Category I allotments.

Grassland Species – Under Alternative D, there are no specific management actions for neotropical migrants that utilize grasslands. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Surface disturbance under Alternative D is less than Alternative A, and Alternative D limits habitat fragmentation similar to Alternative C, which would result in beneficial impacts to grassland habitats and grassland species.

Riparian and Wetland Species – Alternative D actions that protect, enhance, and restore water and riparian and wetland habitats are anticipated to benefit neotropical migrants that use riparian and wetlands. For example, Alternative D manages the vertical and horizontal vegetative structure and composition of these areas to enhance forage conditions and improve stream quality. Alternative D does more to reduce the spread of INNS by requiring the use of certified weed-free seed and mulch, similar to Alternative B. Surface disturbance under Alternative D is the second lowest of all alternatives. The greater measures to protect riparian and wetland habitats result in greater beneficial impacts to neotropical migrants in these areas than Alternative A.

Nongame (Mammals)

Although there are no specific management actions for nongame mammals, these species are impacted by other biological resource management actions. Nongame mammals are found in a variety of habitats and are impacted by management actions in the preferred vegetation type of each species. Impacts to the various vegetation types are discussed above for nongame neotropical migrants and are expected to similarly impact nongame mammals.

Approximately 11,437 acres of BLM-administered surface are identified as altered by human (agriculture, mining, urban). The mining portion of this land could contain potential bat habitats. Because wind-energy development could occur on less acreage than Alternative C, adverse impacts to bats under Alternative D are anticipated to be less than Alternative C, but greater than Alternative B.

Nongame (Reptiles and Amphibians)

Although there are no specific management actions for reptiles and amphibians, these species are impacted by other biological resource management actions under Alternative D. The impacts of management actions on these habitat types are discussed throughout this section.

4.4.5.3 Conclusion

Overall, Alternative B provides more measures to minimize habitat loss and fragmentation in the planning area compared to Alternative A. Therefore, implementing Alternative B could have fewer adverse impacts on wildlife and habitats. Alternative D includes similar measures to Alternative B, but allows more surface-disturbing activities. Alternative D is expected to have less adverse impacts than Alternative A due to more restrictions. Alternative C allows the second most surface disturbance of any alternative, resulting in adverse impacts to wildlife resources greater than those under alternatives B and D.

Implementing Alternative B, followed by Alternative D, could result in more improvements to habitat quality, provide more measures to restrict activities that could damage sensitive soils and habitats, reduce disruptive activities for big game on crucial winter range, and set aside more lands for new MAs with specific actions to benefit wildlife resources, compared to alternatives A and C. Alternative A has little guidance to protect or improve habitat quality. Alternatives A and C do not establish any new MAs. Requirements to use certified weed-free seed, mulch, feeds, and forage under alternatives B and D could result in long-term beneficial impacts to wildlife habitat quality. Alternative B provides the most protection for big game on crucial winter ranges from surface-disturbing activities and OHV use over a larger area and for the longest period of time. Based on the actions and uses identified, alternatives ranked in order of increasing potential adverse and decreasing beneficial impacts to the wildlife categories presented in this section are B, D, C, and A.

4.4.6 Special Status Species – Plants

Actions that could occur through implementing each alternative may affect special status plant species. This section describes the impacts of each alternative on special status plants in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to special status plant species. See Map 23 for a depiction of the distribution of select special status plant species for all alternatives.

Allowable uses and management actions that contribute to the decline in abundance or distribution of special status plants are considered adverse. Conversely, beneficial impacts to special status plants comprise activities that protect habitats or reduce the risk of harm to these species in the planning area. An increase in special status plant population numbers in response to an enhanced habitat or the increased viability of a species would be considered a beneficial impact.

Direct impacts to special status plant species are defined, for this analysis, as actions resulting in damage to or loss of individual special status plants. Surface-disturbing activities, herbivory, trampling, fire, and herbicide application are considered the primary means by which direct impacts to special status plants could occur. Plant collection and OHV use also could remove vegetation and disturb soil, directly impacting special status plant populations. Indirect impacts to special status plant species are defined as actions that aid or compromise the protection of special status plants. The loss or degradation of suitable habitats for special status plant species is considered an indirect impact. Indirect impacts to potential habitats for special status plants also could occur when actions change the habitats in a way that makes them unsuitable for future colonization.

For the purpose of this analysis, short-term impacts to special status plant species include those activities that contribute to the decline in abundance or distribution of a species within 5 years of when the activity occurs. Long-term impacts to special status plants are those that require more than 5 years to manifest on the surface.

4.4.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Surface-disturbing activities, including ROW, in special status plant areas would adversely impact special status plant species.
- The amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown and could underestimate the potential impact of surface disturbance on special status plant populations.
- Reclamation of surface disturbance and reestablishment of vegetation minimizes adverse impacts to soils and, therefore, to special status plant species. The sooner the reestablishment of vegetation occurs, the greater the benefit would be to special status plant species.
- Assumptions described in the Vegetation – Riparian and Wetland Communities section of this chapter are used in analyzing the impacts on potential habitat for special status plant species that occur in these habitat types, including Ute ladies'-tresses, an orchid that currently is not known to occur in the planning area, but typically occurs in wetlands and riparian habitat. Special status plant species that occur or have the potential to occur in wetlands and riparian habitats may be impacted by water quality or water use in the planning area.
- All management actions associated with protecting wildlife habitats and cultural resources directly benefit special status plant species.
- Actions that reduce the threat of establishment or spread of INNS directly benefit special status plant species. Instruction Memorandum 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch in restoration projects on public lands.
- The existing provisions in place (e.g., presence/absence surveys by a qualified botanist during the appropriate phenological stage [e.g., blooming] for positive identification and conducted prior to proposed actions) to protect special status species are carried out and conditional monitoring is conducted (e.g., grazing and surface disturbance reclamation) to ensure special status species are not jeopardized.
- Establishing MAs that preclude or restrict development, including those not specifically aimed at conserving special status plant species, are assumed to benefit special status plant species.
- Because not all locations of special status plant species in the planning area are known and because the locations of potential actions under the different alternatives also are not known, the analysis of potential impacts to special status plant species focuses on the threats and management challenges identified in Chapter 3.
- Because the densities and locations of special status plant species in the planning area are not entirely known, impact analyses are based on the amount of vegetation and soil disturbed, the potential for spread of INNS, and the level of restrictions placed on BLM actions that could adversely impact special status plant species.

4.4.6.2 Analysis of Alternatives

Allowable uses and management actions that could impact special status plant species include all surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, OHV use, INNS, and proactive management actions.

As special status plant species are impacted by the alternatives, protective management of these species can impact resource uses. For example, actions designed to conserve special status plant species could limit mineral development, fire and fuels management, livestock grazing, vegetation treatments, OHV use, and control of INNS. The impacts of special status plant species on other resource topics (e.g., fire and fuels management, etc.) are not anticipated to be substantial; however, details are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to special status plant species because of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Described below are potential types of impacts common to all alternatives.

Habitats for special status plants can be impacted by various surface-disturbing activities, such as mineral exploration and development, construction associated with communication or alternative energy (e.g., wind-energy) sites, and associated transportation corridors. Other activities that may remove vegetation and disturb soil, thus potentially adversely impacting habitats for special status plant species, include livestock and native ungulate grazing, intensive recreational use, and human plant collection. Because none of the special status plants that may occur in the planning area depends on forest habitats, forest management and silviculture treatments are not expected to impact special status plant species.

Surface disturbance also can indirectly impact special status plants by contributing to soil erosion that adversely impacts watershed health and contributes to the transport of INNS along the network of roads and watersheds. Soil compaction and erosion, alteration of hydrologic regimes, insecticide applications that may kill pollinators, modified fire-return intervals, and the introduction of native habitats by INNS are potential indirect impacts to special status plant species. Habitat is degraded, lost, and fragmented by activities such as road and trail building, utility transmission corridors, renewable energy projects, OHV use, and recreation. Fire and fuels management and grazing by livestock and wildlife may have adverse or beneficial effects upon habitat. Fragmentation adversely affects special status plants by increasing the amount of habitat edge (Knight et al. 2000), which leads to noxious weed proliferation and microclimate alterations through increased wind and solar exposure. Populations of special status plants frequently have a patchy distribution across the landscape; therefore, elimination of one or more populations can prevent gene flow among populations if residual populations are too far apart for sufficient cross-pollination. Natural surface road networks contribute to a reduction in photosynthetic capacity in plants adjacent to roads when vehicle traffic contributes to additional dust deposits on leaf surfaces (Knight et al. 2000).

Some of the surface disturbance that occurs under each alternative would be reclaimed. The sooner successful reclamation occurs, the greater the benefit to sensitive plant species. Reclamation plans are developed and implemented on newly disturbed areas and for existing disturbances, as needed. Follow-up seeding and (or) corrective erosion-control measures are required on areas of surface disturbance that experience reclamation failure. However, not all impacts to special status plants from surface disturbance are offset by reclamation of disturbed lands because reclaimed lands often do not support the same plant community structure and composition as the habitat that was disturbed. Many special status plants are rare because of their association with a rare habitat, advanced successional stage, or specific landscape feature. These plants might not reestablish on reclaimed lands if the unique habitat characteristics they require are no longer present. Moreover, INNS may establish on reclaimed lands and prevent restoration of historical plant communities.

Grazing (both livestock and wildlife) may provide both adverse and beneficial impacts to special status plant species, depending on grazing intensity, timing and (or) season of grazing, range conditions, and

precipitation regimes. Grazing, particularly in sensitive riparian areas, can result in direct mortality to special status plants through trampling or herbivory, and indirect impacts due to soil compaction and erosion, changes in plant community composition and structure, and increased spreading of INNS (Fitch and Adams 1998). Inappropriate livestock grazing management is a threat to some plant species; grazing has been considered a factor in the endangerment of some imperiled plant species in the United States (Wilcove et al. 1998). Beneficial impacts include grazing that removes competition for light, water, or nutrient from other plants in a rare species habitat.

Some management actions also would benefit special status plants. For example, management actions to control INNS benefit special status plants by reducing competition. Other resource management actions that may indirectly benefit special status plant species include surface disturbance constraints to protect visual, cultural, floodplains, fish, wildlife, and vegetation resources, as well as MAs and NHT buffer areas.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities from all actions listed in Appendix M could impact potential habitats for special status plants and undocumented populations. Such activities also fragment habitats, which can isolate populations of special status plants. Long-term impacts to sensitive plants are mitigated by reclamation, but surface disturbance continues to impact sensitive plant populations occurring on reclaimed lands through changes in plant community structure or encroachment of INNS. BLM actions under Alternative A are anticipated to impact 214,120 acres and 144,673 acres in the short- and long-term, respectively, in the planning area over the life of the plan. No specific constraints on resource management to minimize habitat fragmentation are identified for Alternative A.

Approximately 1,475,000 acres of federal mineral estate are currently administratively available to oil and gas leasing consideration under Alternative A. All of the area available for leasing is subject to the terms and conditions of the standard lease form, with 50 percent also subject to moderate constraints and 22 percent subject to major constraints. Fluid mineral leasing is allowed on areas within habitat for federally listed species; however, if plant surveys document a listed species, protective measures need to be developed and implemented in coordination with the USFWS. Four known populations of *Physaria dornii* (a BLM-sensitive species) have NSO restrictions for fluid minerals. No special measures exist to protect special status plants from motor vehicle damage. In addition, public lands outside the Raymond WSA are available for other leasable minerals leasing considerations. Mineral material sales and (or) free use permits can be authorized in areas with special status plant species on a case-by-case basis. Additional leasing constraints that benefit special status plants could be considered.

Under Alternative A, surface-disturbing activities utilize existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Surface-disturbing activities are developed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reestablishment of vegetation over disturbed soils would usually occur within 3 years of initial seeding. If vegetation establishment is unsuccessful within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed. Management actions limiting surface disturbance will benefit special status plants.

Fire and Fuels Management. Under Alternative A, wildland fire suppression follows an AMR as identified in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative

A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Special status plant species in the planning area are not anticipated to be adversely impacted by prescribed fire that mimics a natural fire regime. Intense wildland fire-suppression tactics are anticipated to be the most likely actions to adversely impact undocumented populations of special status plant species. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which would also protect special status plant species. Use of fire-suppression chemicals, including foaming agents and surfactants, is not allowed in special status plant species populations or within 200 feet of surface water sources. Prescribed fire and wildland fire use could be used to reintroduce fire in its natural role back into the ecosystem to meet fire and fuels resource management objectives, which could improve habitats and result in a beneficial impact for special status plant species.

Livestock Grazing. The entire planning area currently is open to livestock grazing with the exception of a few small parcels. Temporary, nonrenewable permits are not issued for unalloted parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on I category and maintaining M and C category (see Glossary) grazing allotments. The location of salt or mineral supplements complies with requirements determined on a site-specific basis, but neither salt nor mineral supplements are allowed on areas with special status plant species. Range improvement projects, such as troughs, reservoirs, and fences, or other surface-disturbing activities are not allowed on areas with special status plant species.

The trend of continued improvement in rangeland productivity in the planning area is expected to continue under current management. The anticipated adverse impacts to special status plant species from current livestock grazing include introduction and (or) spread of INNS, soil erosion and compaction at livestock concentration areas, and removal of vegetation. These adverse impacts are not anticipated around known locations of special status plant species; however, direct and indirect adverse impacts could occur at unknown locations. Native ungulates are anticipated to have similar adverse impacts as livestock to special status species in areas where they concentrate.

OHV Use. OHV use disturbs soils and removes vegetation, thus potentially impacting habitats for special status plants. Current OHV use is limited to existing roads and trails, but operators may go off roads and trails to perform necessary tasks. Most of the Raymond Mountain WSA has been designated "closed" to OHV use. There are no specific measures to protect special status plant species from dust from unpaved roads or motor vehicles. The anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative A due to OHV use is anticipated to indirectly and adversely impact populations of special status plant species.

INNS. Management of INNS could directly benefit special status plants by eliminating direct competition and maintaining habitat health and diversity. However, application of chemicals and other INNS control methods also have the potential to remove vegetation or cause soil disturbance that can adversely impact special status plants. Under Alternative A, appropriate methods of herbicide type and application are used in areas of riparian vegetation, wetlands, and special status plant species. Aerial application of chemicals is not allowed within 100 feet of these resources. Vehicle application is not allowed within 25 feet and hand application is not allowed within 10 feet of open water. Chemicals are mixed a minimum of 500 feet from sensitive resources, including riparian areas, wetlands, and special status plant populations. Application of chemicals in special status plant areas are considered on a case-by-case basis in coordination with the authorized officer.

Proactive Management Actions. Management of other resources could indirectly impact special status plants. Beneficial impacts to special status plants occur with the protection and conservation of land for other resources.

Under Alternative A, all appropriate measures to protect all threatened, endangered, and sensitive plant species are applied to all actions and use authorizations, including NSO restrictions for fluid minerals (currently, four populations of *Physaria dornii* have the NSO restriction). Areas where special status plants are known to occur are ROW avoidance areas. Potential special status plant species habitats on federal land or split-estate lands require surveys for the plant species prior to approving any project or activity. Should a population be found, all surface-disturbing activities are halted until species-specific protective measures are developed and implemented.

Potential habitats for special status plant species are areas of CSU for surface-disturbing activities or vegetation treatments. In addition, there are 12,667 acres in the Raymond Mountain ACEC plan that protect riparian areas, which may provide protection for special status plant species occurring in these habitats. Management actions that protect special status plant species, as well as other resources (e.g., wildlife, cultural resources), provide direct and indirect beneficial impacts to special status plant species.

Alternative B

Surface-disturbing Activities. Under Alternative B, there are 104,338 acres (approximately 51% less) short-term and 47,232 acres (approximately 67% less) long-term disturbance anticipated in the planning area from BLM actions compared to Alternative A. Approximately 45 percent less acreage of federal mineral estate is administratively available for oil and gas leasing compared with Alternative A, with the majority (84%) subject to the terms and conditions of standard lease plus major constraints. No new fluid mineral leasing occurs on currently unleased areas within potential habitats for federally listed species. Withdrawals from locatable mineral development are pursued for areas with special status plant species. No mineral material sales and (or) free use permits are authorized in areas with special status plant species. The restrictions on habitat fragmentation and fewer disturbed acres relative to Alternative A are anticipated to indirectly benefit special status plants by protecting potential habitats and minimizing the spread of INNS and soil erosion.

Under Alternative B, all proposals for surface-disturbing activities within the planning area require soil surveys and analysis, which could include discovery of unknown special status plant populations. Similar to Alternative A, surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines; however, surface-disturbing activities are prohibited in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate mitigation developed for site-specific erosion control. Disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are prohibited. Alternative B provides greater protection and minimizes impacts to soils compared with Alternative A, therefore providing greater protection and minimization of potential impacts to known and unknown locations of special status plant species.

Interim reclamation of surface disturbance occurs within the first planting season after the rig is moved off location for oil and gas operations. Final reclamation of well locations will begin within the first planting season once the well is plugged. Reestablishment of healthy native plant communities based on preexisting composition or other species as identified in an approved management plan would occur under this alternative. A reclamation plan will be developed and approved prior to any surface-disturbing activities being authorized. Monitoring of reclamation success would begin during the first growing season after seeding. Performance standards will be based on site-specific objectives for reclamation and will be identified in the approved reclamation plan. Appropriate reclamation standards are developed at

the project level. The sooner reclamation occurs, the greater benefit to special status plant species. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on a preexisting species composition or other species as identified in an approved management plan.

Based on the acreage of surface disturbance and the management actions implemented to reduce disturbance to special status plant species, direct and indirect adverse impacts from surface-disturbing activities to special status plant species under Alterative B are expected to be less than under Alternative A. In addition, Alternative B provides greater beneficial impacts to special status plant species than Alterative A.

Fire and Fuels Management. Alternative B is similar to Alternative A except that under Alternative B, soil disturbances are not allowed in the planning area during fire suppression without consent of the authorized officer. Use of fire-suppression chemicals, including foaming agents and surfactants, are not allowed within ¼ mile of special status plant species populations or within 500 feet of surface water sources. Similar to Alternative A, treatments could be used to meet fire and fuels resource management objectives, but the objectives are based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area.

Alternative B restricts the use of heavy equipment and fire-suppression chemicals in a broader area than Alternative A. Alternative B uses prescribed fire, as well as other treatments to meet fire and fuels management objectives found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. Direct and indirect adverse impacts to special status plant species under Alterative B are expected to be less than under Alternative A.

Livestock Grazing. Under Alternative B, the planning area could be open to livestock grazing on a case-by-case basis where livestock grazing is not in conflict with other resources. No temporary, nonrenewable permits are issued for unalloted parcels. Unalloted public lands containing riparian areas are managed with an emphasis on wildlife and watershed objectives. Areas including designated camping areas, Ryan Creek/Lost Creek (Lost Creek Coordinated Resource Management Plan Area), coal mines, sensitive cultural sites, oil- and gas-production facilities, and the Mike Matthias Wetlands at Wheat Creek Meadows are not available for livestock grazing. Under Alternative B, grazing system and range improvements are implemented to enhance watershed, riparian, and wildlife values while reducing livestock conflicts with other resources. Salt or mineral supplements are located a minimum of ½ mile away from water resources, riparian areas, and areas with special status plant species. Range improvement projects, such as troughs, reservoirs, and fences, or other surface-disturbing activities are not allowed within ½ mile of special status plant species populations unless they are determined to benefit that species.

Alternative B generally allows livestock grazing over the same area identified under Alternative A; however, grazing would be unavailable in areas identified for the protection of specific resource values under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands, including riparian areas, wetlands, and areas of special status plant species. Increased protection of riparian and wetland resources benefits special status plants species that occur in these habitats, including potential habitats for Ute ladies'-tresses. The anticipated adverse impacts to special status plant species from current livestock grazing are not anticipated around known locations of special status plant species; however, due to stricter management of livestock grazing, direct and indirect adverse impacts to unknown locations of special status plants under Alternative B are expected to be less than under Alternative A.

OHV Use. Under Alternative B, more area is designated as closed to OHV use (33,896 acres). No off-trail travel is allowed. Riparian and wetland areas are designated closed to OHV use except for designated road crossings. Areas with special status plant species are designated closed to vehicle use, and unpaved roads are not allowed within ¼ mile of areas with special status plant species. The anticipated soil disturbance, vegetation removal, and transport of INNS from OHV use under Alternative B are anticipated to produce the least adverse impacts to known and unknown populations of special status plant species compared to other alternatives.

INNS. Under Alternative B, aerial application of chemicals is not allowed within ½ mile and vehicle and hand applications are not allowed within ¼ mile of special status plant species. Chemicals are mixed a minimum of ¼ mile from sensitive resources, including special status plant populations. In addition to the requirement for certified weed-free seed and mulch in restoration projects, Alternative B also requires the use of certified weed-free forage and feeds for livestock supplementation to prevent the introduction or establishment of new weed areas, which may affect special status plant populations.

The greater the distance from riparian areas, wetlands, and special status plant populations that chemicals are applied or mixed, the lesser the potential for impacts associated with vegetation removal, soil disturbances, or chemical spills to these resources. Therefore, direct impacts to special status plant species associated with application of INNS control methods are anticipated to be less for Alternative B than Alternative A. The weed-free seed, mulch, forage and feed requirements provide indirect benefits for special status plants.

Proactive Management Actions. Under Alternative B, known locations of special status plant species are protected and closed to surface-disturbing activities. All populations of *Physaria dornii* have an NSO restriction for fluid minerals. Areas where special status plants are known to occur are ROW exclusion areas. Surface-disturbing activities proposed for potential habitats of special status plant species on federal land or on split-estate lands require surveys for the plant species prior to approving any project or activity. Should a species be found, all surface-disturbing activities are halted. Surface-disturbing activities are prohibited in potential habitat areas for special status plant species. Vegetation treatments are allowed in potential habitat areas for special status plant species only when they benefit the species.

Under Alternative B, special status plant species' habitats and cushion plant communities are designated ACECs; special status plant populations and cushion plant communities designated as ACECs also are designated Research Natural Areas (RNAs). Special status plant species benefit from ACEC designations, and RNA designation provides additional protection to the ACEC designation. In addition to the Raymond Mountain ACEC, under Alternative B, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife, cultural resources). Management actions that protect special status plant species' habitats and populations, as well as other resources, provide direct and indirect beneficial impacts to special status plant species. Alternative B provides the most protection to special status plants species of all alternatives.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short- and long-term surface disturbances from BLM management actions are the second highest of all alternatives. Under Alternative C, there are approximately 39,000 acres less short-term disturbance, but only 206 acres less long-term disturbance anticipated compared to Alternative A. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources and the protection and mitigation to address these activities. Restrictions to oil- and gas-related activities and reclamation of surface disturbance requirements are similar to Alternative A. Direct and indirect adverse impacts to special status plant species from surface disturbance activities under Alternative C are anticipated to be similar to Alternative A.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. Soil disturbances are not allowed during fire suppression unless private or public habitable structures or industrial facilities are at risk. Use of fire-suppression chemicals, including foaming agents and surfactants, is not allowed in special status plant species populations (similar to Alternative A), but is allowed elsewhere in the planning area. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of , some direct impacts are reduced. However, by not using prescribed fire, which could lead to habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts to special status plant species.

Livestock Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small, isolated tracts currently not permitted or leased for grazing as well as other public lands in the planning area. The Mike Mathias Wetlands at Wheat Creek Meadows are available for livestock grazing. Grazing system and range improvements are implemented to maximize livestock grazing while maintaining (meeting standards and guides) other resource values. Location of salt or mineral supplements and range improvement projects are the same as Alternative A.

The anticipated adverse impacts to special status plant species from livestock grazing under Alternative C are not anticipated around known locations of special status plant species; however, due to a greater emphasis on livestock values, which minimizes protection of riparian and wetland resources, direct and indirect adverse impacts to unknown locations of special status plants under Alternative C are expected to be slightly greater than under Alternative A.

OHV Use. Under Alternative C, approximately 32,787 acres are closed to OHV use. Limited off-trail travel is allowed to perform necessary tasks, as long as it does not cause resource damage or create new trails. Similar to Alternative A, there are no specific measures to protect special status plant species from dust from unpaved roads or motor vehicles. The anticipated soil disturbance, vegetation removal, and transport of INNS by OHV use under Alternative C are anticipated to produce slightly less adverse impacts to populations of special status plant species compared to Alternative A.

INNS. For aerial-, hand- and vehicle-application of herbicides, Alternative C restrictions are the same as for Alternative A, except that buffer areas for mixing chemicals are a minimum of 100 feet (400 feet less of a distance than Alternative A) from sensitive resources, including riparian areas, wetlands, and special status plant populations. The lesser the distance from sensitive resources that chemicals are mixed, the greater the potential for spills to adversely impact these areas. In addition to the requirement for certified weed-free seed and mulch in restoration projects, Alternative C also recommends the use of certified weed-free forage and feeds to prevent the introduction and establishment of new weed areas, which can indirectly benefit special status plant species.

Proactive Management Actions. Alternative C is the same as Alternative A, except that NSO restrictions for fluid minerals are removed from populations of *Physaria dornii*. Unlike the other three alternatives, no surveys for special status plant species are required, except for federally listed, proposed, or candidate species prior to approving any project or activity. No limitations are placed on surface-disturbing activities. Vegetation treatments in potential habitat areas for special status plant species are conducted to produce a desired plant community to benefit all resources complying with sensitive species policy (not all vegetation treatments benefit special status plant species). Under Alternative C, there are no special status plant species populations and cushion plant communities designated as ACECs. The area within the current Raymond Mountain ACEC is not designated as an ACEC. Alternative C provides minimum protection to known and unknown populations of special status plants compared with other alternatives.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, the second lowest acreage of short-term and long-term disturbance is anticipated in the planning area from BLM management actions compared to Alternative A. Alternative D is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. However, under Alternative D, approximately 1,400,000 acres of federal mineral estate are administratively available for oil- and gas-leasing consideration (slightly less than for Alternative A), all of which is subject to the terms and conditions of the standard lease form. Approximately 50 percent of the acreage also is subject to moderate constraints and 34 percent is subject to major constraints.

Under Alternative D, protection and mitigation to address surface-disturbing activities is the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances and to reduce impacts and fragmentation of habitats. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. Oil- and gas-related activities are restricted on slopes greater than 25 percent and NSO restrictions for fluid minerals are implemented for slopes greater than 40 percent, as in Alternative A. In addition, surface-disturbing activities are avoided in areas of sensitive, highly erosive, and excessively steep slopes of 20 percent or greater. Any disturbance in areas with 20 percent or greater slopes would require additional consideration of slope stabilization and erosion-control techniques. Disturbances on soils with fragile, steep slopes, chemical and biological crusts, and soils with low reclamation potential and highly erodible characteristics are avoided and require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as Alternative B. Direct and indirect adverse impacts to special status plant species from surface-disturbance activities under Alternative D are anticipated to be less than under alternatives A and C, but more than under Alternative B.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows an AMR as identified in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). This includes suppression of fires to provide first for human health and safety and minimizing loss of property and threats to other surface owners, such as in areas of high-density urban or industrial interface with intermingled BLM-administered lands, then for allowing achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). During fire-suppression activities, soil disturbance on public lands is not allowed without consent from the authorized officer. Use of fire-suppression chemicals is managed similar to Alternative A and use of prescribed fire, as well as chemical, biological, and mechanical treatments, is similar to Alternative B. Prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role into the ecosystem to meet fire and fuels resource management objectives, same as Alternative A, which could improve habitat and result in a beneficial impact for special status plant species.

Livestock Grazing. Alternative D is similar to Alternative A, except livestock grazing on small, isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock the same as Alternative A. Salt or mineral supplements are located a minimum of ¼ mile away from special status plant species. Range-improvement projects, such as troughs, reservoirs, and fences, or other surface-disturbing activities, are not allowed within known special status plant species populations (similar to Alternative A). Buffers are based on resource concerns on a case-by-case basis. Under Alternative D, there is greater protection and therefore, less direct and indirect adverse impacts to areas of special status plant species than under Alternative A.

OHV Use. Alternative D closes the second highest number of acres to OHV use (33,037). No new unpaved roads are allowed within 250 feet of areas with special status plant species unless NEPA analysis determines the road would not adversely impact the species. In areas with special status plant species, all vehicles, including emergency vehicles, are restricted to existing roads and trails (the authorized officer has the discretion to lift this requirement in an emergency situation). The anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative D from OHV use are anticipated to produce slightly less adverse impacts to populations of special status plant species compared to Alternative A.

INNS. Similar to Alternative B, this alternative requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds for livestock supplementation. These actions help prevent the introduction and establishment of new weed areas, which can indirectly benefit special status plant species.

Proactive Management Actions. Under Alternative D, surface-disturbing restrictions in known locations of special status plant species are similar to Alternative B, except that NSO restrictions for fluid minerals are removed from populations of *Physaria dornii*. Surveys for special status plant species and protection measures are similar to Alternative A. Vegetation treatments in potential habitat areas for special status plant species could be conducted on a case-by-case basis when they would benefit these species.

Under Alternative D, special status plant species habitats and cushion plant communities are designated ACECs (similar to Alternative B), but special status plant populations and cushion plant communities designated ACECs are not designated as RNAs. In addition to the Raymond Mountain ACEC, under Alternative D, several areas within BLM-administered lands are given special designation for protection of sensitive resources (e.g., wildlife, cultural resources), but these would not be as extensive as under Alternative B. Alternative D provides greater protection to special status plants compared with alternatives A and C, but less protection than the maximum provided by Alternative B.

4.4.6.3 Conclusion

Fewer acres are subject to surface-disturbing activities and habitat fragmentation under Alternative B, followed by alternatives D and C. Alternatives B and D also have more provisions to protect sensitive soils and habitats, such as riparian areas, and include more management restrictions that would benefit special status plant species. Alternative A has the highest potential to damage sensitive soils and other unique habitats because it has the highest amount of surface disturbance, potentially resulting in direct and indirect adverse impacts to special status plant species. Alternative B provides the greatest protection from direct adverse impacts associated with livestock grazing and management of INNS, followed by alternatives D and C.

Special status plants receive more indirect benefits from management for other resources, such as special status wildlife species and cultural resources, under alternatives B and D. Alternative B, followed by Alternative D, sets aside the most land for new MAs, which could indirectly benefit special status plants. Based on the acreage of surface disturbance and the acreage protected from habitat fragmentation, alternatives with the least to most potential adverse impacts to special status plant species are alternatives B, D, C, and A.

4.4.7 Special Status Species – Fish

Actions that could occur through implementing each alternative could impact special status fish species. This section describes the impacts of each alternative on special status fish species in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse.

No federally listed fish species occur in the planning area; however, the federally endangered bonytail, Colorado pikeminnow, humpback chub, and razorback sucker occur in the Green River and Colorado River systems downstream of the planning area and could be impacted by management activities in the part of the planning area comprising the Colorado River watershed (see Map 7). In addition, seven BLM sensitive species occur in the planning area: roundtail chub, leatherside chub, bluehead sucker, flannelmouth sucker, Colorado River cutthroat trout, Bonneville cutthroat trout, and fine-spotted Snake River cutthroat trout. The impacts to BLM sensitive species are similar to those described for Fish and Wildlife Resources – Fish and focus on water quality, water quantity, and riparian-area conditions. The potential impacts of each alternative on the federally listed species occurring downstream of the planning area focus on water depletion.

Adverse impacts to the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker could occur through depletion of water in the Green River and Colorado River systems, resulting from water use in a portion (i.e., Colorado River watershed) of the planning area. Adverse impacts to these federally listed fish species also could occur through degradation of water quality in the Green River and Colorado River systems. Activities in the Colorado River watershed portion of the planning area that would measurably reduce the quantity or quality of water in downstream reaches of the Green River and Colorado River are considered indirect adverse impacts. Water depletions are considered a long-term adverse impact because implementation of management actions projected to cause water depletion is anticipated to occur over the life of the plan. Degradation of water quality is considered a short-term adverse impact because individual surface-disturbing activities are anticipated to occur over a relatively short period (less than 5 years).

4.4.7.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Water consumption in the Green River watershed may adversely impact surface water quantity in the larger Colorado River system. Water depletion analyses are based on the assumption that all water used for drilling and completion of wells and evaporation from reservoirs within the Green River watershed contribute to surface flows of the Colorado River or its tributaries.
- For Green River and Colorado River systems species, the area evaluated includes the portion of the planning area drained by the Colorado River, as well as areas of the Green River and Colorado River systems downstream of the planning area.
- The number of projected oil and gas wells within the Colorado River watershed varies by alternative and is estimated based on the potential for oil and gas development within the watershed.
- Based on assumptions for water use during well drilling, completion, and dust abatement, as well as for impoundment size and evaporation rates, each conventional oil and gas well uses approximately 2 acre-feet of water over the life of the plan.
- Produced water from CBNG drilling is assumed to have a negligible influence on surface water quantity and quality in the Colorado River watershed.
- Each livestock well or spring maintains an average of two stock troughs approximately 10 feet in diameter (79 square feet [ft^2]) each, for a per-project surface area of 157 ft^2.

4.4.7.2 Analysis of Alternatives

Allowable uses and management actions that could indirectly impact special status fish species include all surface-disturbing activities with the potential to degrade water quality in the Green and Colorado rivers and water-development actions able to deplete water quantity in the Colorado River system. The types of impacts projected to impact water quality and quantity in the Colorado River watershed are anticipated to be common to all alternatives and, therefore, are discussed in the following section. The intensity of

impacts to water quality and quantity are anticipated to vary by alternatives and are described in subsequent sections. See the Water section and the Fish and Wildlife Resources – Fish section of this chapter for additional detail on impacts to water quality and water quantity.

Impacts Common to All Alternatives

Reduced water flow in the Green River and Colorado River can lead to adverse impacts on the ecosystems that support the bonytail, Colorado pikeminnow, humpback chub, and razorback sucker. Changes in flow regimes (i.e., perennial flows) may impact these species by altering their use of spawning, rearing, and reproduction. Impacts could include loss of habitat and disruption of migration movements. The Colorado River Compact (1922) provides for the apportionment of the use of the waters of the Colorado River system, of which Wyoming is a part. The Colorado River System Salinity Control Act (P.L. 93-320) controls the salinity of water delivered to users in the United States and Mexico. Activities that lead to degradation of riparian areas adversely impact all special status fish species' habitats.

Water Quality

The potential to adversely impact water quality in the planning area is primarily a function of surface-disturbing activities and associated soil erosion, particularly on soils highly susceptible to water erosion. Actions removing vegetation and disturbing soil, thereby increasing the potential for offsite erosion and sediment delivery into the stream system, are primarily anticipated to be surface-disturbing activities. Appendix M provides data regarding surface-disturbance acreage and RFD actions by alternative. Other actions, including concentration of livestock, fire and fuels management, and OHV use also are anticipated to remove or reduce vegetation and disturb soil, but are expected to have less potential to degrade water quality in the Colorado River watershed.

Under all alternatives, sedimentation would be minimized by implementing appropriate BMPs and through the development and implementation of Erosion, Revegetation, and Reclamation Plans (ERRPs). In general, produced water from CBNG wells can result in higher volumes of water, as compared with conventional natural gas wells, and is relatively high quality in the planning area because it is derived from formations closer to the recharge areas. Negligible adverse impacts to surface water quality from CBNG development are anticipated under any alternative after implementing BMPs and other mitigation measures. Please refer to the Water section earlier in this chapter for more information about potential impacts to surface water quality.

Water Quantity

Development of oil and gas wells can impact surface and groundwater quantity through water use associated with well drilling and completion, as well as through the surface disposal of produced water from CBNG wells. The amount of water used for drilling and completion of wells, including water for dust abatement and other post-drilling activities, is relatively similar for most types of wells. Water used for well construction and completion is assumed to reduce the amount of water available for use in the Green River and Colorado River downstream of the planning area. The volume of produced water from CBNG wells impacting surface and groundwater quantity depends on the amount of water disposed into surface waters, reinjected, or disposed into impoundments. The contribution of produced water from CBNG wells is anticipated to be negligible compared to projected water depletions.

Projected development of springs and wells for livestock are anticipated to deplete water in the Colorado River watershed. The number of wells and springs for livestock is the same under all alternatives. Table 4-10 summarizes the average annual depletion for each water-depleting action by alternative.

Table 4-10. BLM Actions and Potential Water Depletions in the Colorado River Watershed During Implementation of the Kemmerer Field Office Resource Management Plan

Alternative	Action	Number	Average Annual Depletion (acre-feet)
A	Oil and Gas Drilling	963	96.3
	Livestock Water Wells and Springs	41	0.6
	Total		**96.9**
B	Oil and Gas Drilling	486	48.6
	Livestock Water Wells and Springs	41	0.6
	Total		**49.2**
C	Oil and Gas Drilling	971	97.1
	Livestock Water Wells and Springs	41	0.6
	Total		**97.7**
D *(Proposed RMP)*	Oil and Gas Drilling	963	96.3
	Livestock Water Wells and Springs	41	0.6
	Total		**96.9**

Note: Due to the programmatic nature of RMP alternatives, key assumptions made for calculating projected water depletion in the Colorado River watershed over the life of the RMP include the following:

(1) The Colorado River watershed comprises 58 percent of the planning area.

(2) All Moxa Arch and CBNG coalbed natural gas wells and 58 percent of the Overthrust Belt wells are within the Colorado River watershed.

(3) Livestock wells and springs are evenly distributed throughout the planning area.

(4) All wells and springs projected for development over the life of the RMP are constructed and completed in year 1.

(5) Water depletions associated with conventional oil and gas drilling are calculated using an average depletion of 2 acre-feet per well occurring in the Colorado River watershed by alternative. Oil and gas well numbers were derived from the RFD Scenario for Oil and Gas (BLM 2006b; BLM 2008a).

(6) Potential water depletion for fire management is not included in calculations due to the nonpredictive nature of unplanned fire and the negligible water depletion associated with planned fire.

CBNG coalbed natural gas
RFD Reasonable Foreseeable Development
RMP Resource Management Plan

Alternative A

Water Quality

Alternative A has the greatest potential to adversely impact special status fish species because this alternative has the largest areas administratively available for mineral development and the least restrictions on surface-disturbing activities. Under Alternative A, the Raymond Mountain ACEC is retained to protect Bonneville cutthroat trout habitats; no other special designations are implemented. Alternative A manages 13 waterway segments to protect the free-flowing values of these rivers and creeks. Alternative A does not apply management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitat for the Snake River cutthroat trout. Alternative A provides for preserving the natural functions of riparian areas by avoiding surface-disturbing activities within 500 feet wetlands, riparian areas, aquatic habitats, and 100-year floodplains. Alternative A does not actively address human-caused barriers to fish movement.

Water Quantity

Alternative A imposes the fewest restrictions on activities that remove vegetation and compact soils, resulting in increased storm water runoff entering streams. This alternative is projected to have the second highest number of federal wells drilled (1,012 wells). The disposal of CBNG-produced water is subject to local, state, and federal laws and regulations. Alternative A has the second greatest water depletion and, therefore, the second greatest adverse impact on special status fish species.

Alternative B

Water Quality

Alternative B proposes less surface disturbance over the long term compared with Alternative A and the least of all alternatives. Alternative B restrictions on surface-disturbing activities and the prohibition of discharging produced waters to streams are expected to result in the least adverse impacts to Class 1 and 2 streams relative to Alternative A and other action alternatives.

Under Alternative B, the Dry Fork, Upper Tributary, and Lower Tributary watersheds are designated ACECs to protect Bonneville cutthroat trout and leatherside chub habitats. These designations result in greater beneficial impacts for these species than Alternative A, which does not designate these areas as ACECs. Alternative B also recommends 13 eligible waterways as suitable for inclusion in the national wild and scenic rivers system. Alternative B applies management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitat for the Snake River cutthroat trout. Management actions may include: conducting riparian ecology studies to provide site specific information for the development of best grazing management practices for the long term improvement of riparian and aquatic habitat; grazing use adjustments, including coordination with allotment users, that may be necessary in select areas to provide stream bottoms with the maximum amount of rest possible**;** aspen and willow stand reestablishment and instream flow studies; and stabilization of roads and culverts to mitigate impacts where sensitive stream crossings are affected. Alternative B's management of human-caused barriers to fish movement, including, but not limited to irrigation diversions, road crossings, and damaged culverts, results in greater beneficial impacts to special status fish species than Alternative A, especially with respect to the three subspecies of cutthroat trout, by providing for genetic diversity and population stability. An increase in the buffer around riparian areas, and the fact that this buffer is an exclusion area, results in greater beneficial impacts to special status fish species than Alternative A.

Water Quantity

Alternative B results in the least amount of change to surface water quantity because the fewest federal wells are drilled (503 wells), disposal of produced waters to streams is prohibited, and more restrictions on surface-disturbing activities are implemented than under Alternative A or the other action alternatives. Alternative B has the least water depletion and, therefore, the least adverse impact to special status fish species.

Alternative C

Water Quality

Alternative C has similar potential to degrade water quality as Alternative A through increased sedimentation due to having the similar restrictions on surface-disturbing activities. Alternative C's proposed restrictions and reclamation requirements are anticipated to result in similar adverse impacts to water quality as Alternative A.

Alternative C does not retain the Raymond Mountain ACEC and does not designate any other areas as ACECs to protect special status fish species' habitats. Alternative C does not apply management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitats for the Snake River cutthroat trout, similar to Alternative A. The lack of specific protections for watersheds results in least beneficial impacts to special status fish species' habitats of all alternatives, similar to Alternative A. Beneficial impacts from riparian area protections are similar to Alternative A. Management of human-caused barriers to fish movement under Alternative C is similar to Alternative A, therefore resulting in similar impacts.

Water Quantity

Alternative C results in the greatest amount of change to surface water quantity because the most federal wells are drilled (1,020 wells) and disposal of produced water is allowed providing it meets local, state, and federal laws and regulations, similar to Alternative A. Alternative C has slightly greater water depletion (0.2 acre-feet more) than Alternative A and is anticipated to result in similar adverse impacts to special status fish species as Alternative A.

Alternative D (Proposed RMP)

Water Quality

Alternative D has the second lowest acreage administratively available to mineral leasing with standard stipulations and the highest acreage administratively available with moderate constraints. The anticipated impacts to water quality for Alternative D are anticipated to be similar to, but less than, Alternative A.

Alternative D retains the Raymond Mountain ACEC and recommends Huff Creek and Raymond Creek for inclusion in the national wild and scenic rivers system. These designations may benefit fisheries in general and provide more management direction to protect existing resource values than Alternative A. This type of management results in greater beneficial impacts to fisheries habitats than Alternative A, but less than Alternative B. Alternative D applies management actions from the *Conservation Agreement and Strategies and Thomas Fork Aquatic Habitat Management Plan* (BLM 1979) to support habitats for the Snake River cutthroat trout, similar to Alternative B. Similar to Alternative A, Alternative D avoids surface-disturbing activities within 500 feet of riparian areas. However, Alternative D provides additional protection of riparian areas than Alternative A to specifically improve stream water quality, resulting in greater beneficial impacts to special status fish species than Alternative A. Impacts to special status fish species based on management of human-caused barriers to fish movement under Alternative D are the same as Alternative B.

Water Quantity

Although the number of federal wells drilled under Alternative D is similar to Alternative A, Alternative D results in fewer adverse impacts to fish habitats because Alternative D implements more restrictions by requiring a BLM-approved produced water disposal plan. Impacts from water depletion are similar to Alternative A.

4.4.7.3 Conclusion

Alternative B has the least impact on water quality because it has the lowest levels of surface disturbance and the greatest protection for erodible soils among all the alternatives. According to Appendix M, alternatives A and C are anticipated to contribute the most sediment and the most runoff to surface water and, therefore, could have the most adverse impacts on water quality.

Regarding water quantity, Alternative C has the greatest water depletion and alternatives A and D have slightly less (0.2 acre-feet less) water depletion and, therefore, are likely to have the greatest potential to adversely impact special status fish in the Colorado River. Anticipated adverse impacts to water quantity from Alternative B are anticipated to be the least (59.1 acre-feet).

Based on the above anticipated adverse and beneficial impacts, Alternative B is anticipated to have the least adverse impact to special status fish species. Alternatives A and C are anticipated to have the greatest adverse impact to special status fish species.

4.4.8 Special Status Species – Wildlife

Actions that could occur through implementing each alternative could impact special status wildlife species. This section describes the impacts of each alternative on special status wildlife in terms of direct, indirect, short-term, and long-term impacts. Impacts also are described as beneficial or adverse to special status wildlife. Refer to Maps 24 through 26 for special status wildlife species and Map 21 for vegetation.

Direct impacts to special status wildlife result from the direct loss of critical habitats or a key habitat feature, such as a nest site or lek area, or from the immediate loss of life. Special status wildlife also can be directly disrupted by human activities, potentially causing them to abandon a nest, lek, or home range. It has been widely documented that disturbance during sensitive periods (e.g., winter, nesting) leads to lower recruitment rates and higher mortalities, which adversely impact special status species wildlife.

Habitat loss and fragmentation are assumed to adversely impact special status wildlife. These conditions are described in more detail in the introductions to Biological Resources in this chapter and in Chapter 3. Habitat loss generally is a direct impact; i.e., the individual or population is immediately impacted. The impacts of habitat fragmentation, however, operate indirectly through mechanisms, such as population isolation (Saunders et al. 1991); edge impacts, such as increased nest predation and parasitism (Paton 1994; Faaborg et al. 1995); encroachment of INNS; and disruption of migration patterns.

Indirect impacts to special status wildlife occur by changing habitat characteristics or quality, which can ultimately result in changes in migration patterns, habitat use, carrying capacity, and long-term population viability. Indirect impacts to habitats for special status wildlife also could occur when specific actions change the habitat in a way that makes it unsuitable for future habitation.

Disturbance impacts could range from short-term displacement and shifts in activities to long-term abandonment of home range (Miller et al. 1998; Yarmaloy et al. 1988; Connelly et al. 2000). For the purpose of this analysis, short-term impacts (up to 5 years) to special status wildlife are those activities that an individual or species responds to immediately, but does not impact the population viability of the species. Long-term impacts (more than 5 years) are those that cause an individual or species to permanently abandon an area or that impact the population viability and survival of the species.

4.4.8.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- To focus the discussion for a more specific analysis of impacts, special status wildlife species are grouped according to statutory wildlife categories, as described in Chapter 3.
- Impacts to special status wildlife species are primarily based on potential impacts to habitats that the BLM manages.
- Precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, population data for special status wildlife species are often lacking, or habitat types affected by surface-disturbing activities cannot be predicted.
- Actions that would adversely impact or benefit one species would have similar impacts on other species using the same habitats.
- Public concern for special status species will likely increase over the planning period due to increasing concerns over growth and development on habitats containing these species.

- Over the life of the plan, some species that are currently considered sensitive, or not formally included in BLM's sensitive species list, may be listed under the ESA. Some currently listed species may be delisted during the life of the plan. Most species that are delisted or downgraded from federally proposed or candidate status will be included on the BLM sensitive species list.
- The more acreage protected by a buffer, the greater the benefit to the targeted species.
- In terms of buffers, prohibit means no activity or impact will be allowed during a specific time period or in a designated habitat area, unless specific biological exception conditions are met. Avoid means to utilize guidance for avoidance when possible.
- Prohibiting all nonbeneficial ground disturbance and disruptive activities in greater sage-grouse habitats would be providing a higher level of protection for greater sage-grouse than avoiding these activities.
- Under all alternatives, recommendations by local Sage-Grouse Working Groups for improving and maintaining greater sage-grouse habitats would be adopted if budget and policy allow.
- Management of sagebrush habitats would follow the *BLM National Sage-Grouse Habitat Conservation Strategy* (BLM 2005c). Using these guidelines, greater sage-grouse would serve as an umbrella species for all sagebrush-dependent species.
- The more sagebrush acreage protected, the greater the benefit to greater sage-grouse and other sagebrush-dependent species.
- Removal of sagebrush habitat will have a long-term adverse impact on sage-obligate species.
- Measures to protect greater sage-grouse will benefit all sagebrush-dependent species.
- Short- and long-term surface disturbance (see Appendix M) are assumed to occur in vegetation types in proportion to the availability of these vegetation types in the planning area. Impact acreages for vegetation types are not absolute, but serve as a relative comparison among alternatives.
- Because of the migratory nature and relative mobility of some special status wildlife species (e.g., waterfowl, neotropical migrants, and raptors), these species also will be impacted by actions on non-BLM-administered lands. Adverse impacts to wildlife during different life stages on non-BLM-administered lands can reduce populations regardless of BLM protective measures.
- Potential impacts are typically described for Alternative A relative to surface-disturbing and other activities anticipated with this alternative. Potential impacts from action alternatives are typically described in less detail and relative to impacts anticipated from Alternative A.
- The BLM can minimize disturbance impacts to special status wildlife by limiting access to nesting, breeding, and brood-rearing sites. Surface disturbance can be controlled through three types of restrictions: (1) NSO for fluid minerals, which prohibits physical presence; (2) CSU, which limits surface use unless there is a documented plan for mitigation; and (3) TLS, which prohibits surface use during specified periods.
- The analysis of special status wildlife species in planning area watersheds focuses on changes in water quantity in the planning area as the primary indirect impact of resource management actions on the watershed species. Refer to the Special Status Species – Fish section for more detail on these analyses and to the Water section for more information about impacts to water quality and water quantity in the planning area. The two main watersheds in the planning area are the Colorado River and the Bear River watersheds.

- For analysis purposes, it is assumed that water use in the planning area may adversely impact surface water quantity in the planning area watersheds. Water depletion analyses are based on the assumption that all water used for impoundments or drilling and completion of wells within the planning area would have contributed to the surface flows of the pertinent watershed. The Colorado River watershed is the only one that is currently analyzed for water depletions.
- The area evaluated for possible impacts to most special status wildlife includes the entire area within the boundaries of the planning area. For the Colorado and Bear River watershed species, the area evaluated includes the portion of the planning area drained by the rivers and their tributaries, as well as areas of the watersheds downstream of the planning area.

4.4.8.2 Analysis of Alternatives

The analysis of alternatives for special status wildlife species does not repeat the allowable uses and management actions proposed for each alternative and described in Chapter 2. Moreover, the types of impacts anticipated for special status wildlife species are similar in nature to the Impacts Common to All Alternatives described for Fish and Wildlife Resources – Wildlife in this chapter; therefore, an extensive description of those impacts is not repeated in this section.

Impacts Common to All Alternatives

The types of impacts projected to occur to special status wildlife species as a result of the various alternatives are similar. Habitats are anticipated to be lost, degraded, reclaimed, protected, enhanced, and fragmented by management actions and allowable uses under all alternatives, although the intensity of impacts is anticipated to vary by alternative. Refer to Table 4-1 for the anticipated short- and long-term surface disturbance from BLM actions in the planning area over the life of the plan. RFAs contributing to this surface disturbance are identified in Appendix M.

Surface-disturbing Activities. Because the precise location of surface-disturbing activities is unknown and because special status wildlife species utilize more than one vegetation type, impacts to special status wildlife from construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining, and vegetation treatments are anticipated to be a function of the amount, density, type, location, and frequency of short- and long-term disturbance. The timing and type of reclamation also is anticipated to impact special status wildlife species. Long-term surface disturbance acreage identified in Table 4-1 accounts for reclamation of some lands following short-term disturbance. Although interim reclamation reduces long-term surface disturbance acreage, the location of permanent facilities (e.g., roads, well pads, etc.) adjacent to reclaimed areas can reduce the utility of reclaimed habitats. For example, the greater the density of permanent facilities in an area, the more the habitat is fragmented and the greater the adverse impact anticipated for special status wildlife. See the Fish and Wildlife Resources – Wildlife section in this chapter for a more detailed description of surface-disturbing activities.

The bald eagle is a BLM sensitive species known to occur within the planning area. Currently, one bald eagle nest and two communal roosts are documented within the planning area; however, the known bald eagle nest is not located on BLM-administered land. As indicated in Table 2-3, activities and habitat alterations that disturb bald eagles are restricted within three zones from within ½ mile to 2½ miles. Bald eagles can be adversely impacted by disturbance or habitat changes at important winter roosts; however, all alternatives establish NSO buffers for fluid minerals around all bald eagle roosts.

Mountain plover is a BLM sensitive species known to occur within the planning area. A TLS restriction is in place (from April 10 through July 10) to protect breeding and nesting habitats for all alternatives. Actions resulting in the loss, degradation, or fragmentation of suitable habitats (e.g., shortgrass prairie, prairie dog towns) and surface disturbance could impact mountain plover habitats. Prior to implementing

any vegetation improvement projects that may disturb potentially suitable mountain plover nesting habitats, the conservation strategies outlined in the *Mountain Plover Biological Evaluation* (BLM 2005l) and the *Mountain Plover Project Screen* (BLM et al. 2004) are implemented in order to minimize direct impacts to nesting mountain plovers and their occupied habitats (BLM 2005l).

Wildlife-disturbing Activities. These are authorized activities that may cause displacement of or excessive stress to wildlife during critical life stages. Wildlife-disturbing activities include human presence, noise, and activities using motorized vehicles or equipment. Each of these activities is anticipated to occur under all alternatives and impact special status wildlife species. See the Fish and Wildlife Resources – Wildlife section in this chapter for a more detailed description of wildlife-disturbing activities. The precise location of wildlife-disturbing activities is not predictable at this level of analysis; therefore, these activities are evaluated during project-specific NEPA evaluations prior to project authorization.

Proactive Management Actions. Select management actions and allowable uses are anticipated to benefit special status wildlife species by promoting individual species and their habitats or by restricting activities of other resource programs (e.g., mineral development, livestock grazing,). Collectively, these actions are described in this section as proactive management actions and include managing vegetation communities and associated wildlife habitats, restricting certain types of development, designating ACECs, managing habitat fragmentation, and developing and protecting water source and associated habitats. See the Fish and Wildlife Resources – Wildlife section in this chapter for a more detailed description of proactive management actions.

All alternatives provide some degree of protection to streams, wells, springs, or other water sources by prohibiting or managing surface disturbance within varying distances from the water sources. Those alternatives providing the greatest protection of water sources beneficial to special status wildlife are anticipated to have the greatest benefit to special status wildlife. Special status wildlife species that use water sources and riparian and wetland habitats within the planning area benefit from management actions common to all alternatives that promote the development and enhancement of water sources. Developing water sources for wildlife and livestock are anticipated to benefit the distribution and health of special status wildlife species within the planning area.

All alternatives continue to manage public lands within the Raymond Mountain WSA in a manner that does not impair its suitability for preservation as a wilderness until the U.S. Congress determines its wilderness designation, benefiting special status wildlife species. The BLM Handbook H-8550-1, *Interim Management Policy for Lands Under Wilderness Review*, provides additional information on managing these types of areas.

Impacts to special status wildlife species generally are described in this section in terms of anticipated surface disturbance, amount of habitat potentially protected from habitat fragmentation, amount of land protected by buffers around nests and leks, amount of water depletion to the Colorado River system, and the potential adverse impacts from other resource program actions. Table 4-11 summarizes select conservation measures anticipated to offset some of the impacts to habitats. In addition, Table 2-3 identifies the acreage by alternative of lands restricted or administratively unavailable to mineral development. These restrictions are anticipated to benefit special status species wildlife in the area.

Alternative A

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are

anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Measures included in Alternative A that may reduce impacts to grizzly bear habitats include seasonal closures of big game crucial winter ranges, seasonal no surface disturbance restrictions around raptor nests, protection of elk calving areas, and limitations of geophysical operations and other surface disturbances around greater sage-grouse leks.

Furbearing Animals

Under Alternative A, there are no specific management actions for Canada lynx; however, management actions that protect the Canada lynx habitats and their prey (primarily snowshoe hares) are anticipated to result in beneficial impacts for Canada lynx. For example, prohibition of surface disturbance within ¾ mile of active raptor nests conserves Canada lynx habitats during the TLS where these habitats overlap; however, this TLS would not provide long-term protection to Canada lynx. Forest management in aspen and coniferous forests could adversely impact Canada lynx habitats by creating different patterns of forest stand type other than the patchwork of early and late succession conditions preferred by Canada lynx (BLM 2005f). Reduction of large woody debris also could result in adverse impacts to Canada lynx by potentially eliminating denning sites, reducing kitten survival, and reducing availability of prey species. Alternative A does not address old growth forest areas in the planning area. Timber removal does not exceed the annual sustainable yield capacity under Alternative A.

Livestock grazing in riparian areas can alter the structure and composition of the areas on which Canada lynx prey species rely on (BLM 2005f). Proper grazing management and implementation of rangeland improvement projects can sustain or improve the health of riparian and wetland areas, benefiting Canada lynx prey species. Under Alternative A, placement of supplements in riparian and wetland communities is considered on a case-by-case basis and improvement of range conditions is focused on higher priority allotments (Category I). Management actions include measures to preserve, protect, and restore natural functions of riparian and wetland communities, benefiting these species.

Predatory Animals

Under Alternative A, there are no specific management actions for gray wolves; however, management actions that protect the habitat gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves. Refer to the Fish and Wildlife Resources – Wildlife section of this chapter for more detail on impacts to big game.

Under Alternative A, management actions that may directly or indirectly minimize impacts to gray wolves include seasonal no surface disturbance buffers around active raptor nests and the four areas of NSO for fluid minerals: bald eagle winter roosts, the Bridger Antelope Trap area, sensitive plant locations, and the ¼-mile buffer of perennial streams in the Raymond Mountain ACEC. These restrictions would benefit wolves only where the habitats overlap. Developing roads under Alternative A is primarily for oil and gas development. Surface disturbance from roads totals 2,256 acres in the short term. Alternative A does not address habitat fragmentation or migration and travel corridors for big game or special status species. Alternative A closes select big game crucial winter ranges to reduce stress to these species during season of use. Alternative A may result in adverse and beneficial impacts to gray wolves.

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance from BLM actions in the planning area are anticipated to result in loss, degradation, and fragmentation of sagebrush habitat (Table 4-1). Specifically, mineral

and energy development has been identified as a potential cause of declining greater sage-grouse populations (Wyoming Sage-Grouse Working Group 2003). Naugle et al. (2006) suggest that activities associated with CBNG wells adversely impact greater sage-grouse; male greater sage-grouse avoid areas with CBNG development. Alternative A does not provide specific guidance or management actions for the prevention of habitat loss and fragmentation. For example, developing minerals and wind-energy facilities on BLM-administered land under Alternative A could result in long-term adverse impacts to greater sage-grouse by fragmenting sagebrush habitats. Alternative A makes no specific decisions regarding wind-energy development in the planning area. Reestablishment of herbaceous vegetation over disturbed soils would usually occur within 3 years of initial seeding, or follow-up seeding and soil testing would occur. For oil and gas activities, reclamation is completed according to the surface use plan. Overall, surface disturbance in sagebrush habitats under Alternative A is anticipated to adversely impact the greater sage-grouse.

Alternative A manages wildland fire following AMR for areas where fire is not desired or can be used as a management tool. In addition, prescribed fire could be implemented to reduce hazardous fuels and meet fire and fuels management objectives. Nelle et al. (2000) concluded that burning did not benefit greater sage-grouse nesting or brood-rearing habitats and adversely impacted nesting habitats due to the extensive time it takes for sagebrush canopy to recover. Because greater sage-grouse hens show fidelity for nesting areas, catastrophic wildland fires that remove large tracts of sagebrush could be detrimental to greater sage-grouse populations (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005a) recommend limiting prescribed fire that may adversely impact dense sagebrush stands with adequate herbaceous vegetation. Fire and fuels management under Alternative A promotes a natural fire regime and may limit the potential for catastrophic fire, benefiting the greater sage-grouse.

Infestations of INNS are spread sporadically throughout the planning area. Plant INNS (weeds) contribute to the loss of rangeland productivity, increased soil erosion, reduced water quantity and quality, reduced species diversity, and loss of wildlife habitats. The BLM uses an integrated weed management program that involves grazing, fire management, and chemical, mechanical, and biological controls (BLM 1990a; BLM 1992d), as well as treats an average of 1,000 acres (see Appendix M) of various weed species each year. Despite these efforts, the spread of INNS is anticipated to degrade sagebrush habitats in the long term. Although the extent of sagebrush habitat degradation from the spread of INNS and other weeds is unknown for the planning area, the potential for these species to substantially impact greater sage-grouse habitats in the future exists (Wyoming Sage-Grouse Working Group 2003). Therefore, the anticipated continued expansion and spread of INNS under Alternative A is expected to adversely impact greater sage-grouse and sagebrush habitats.

By altering habitat components necessary for greater sage-grouse habitats, livestock grazing can impact the suitability and extent of greater sage-grouse habitats in the planning area (Wyoming Sage-Grouse Working Group 2003). Holloran et al. (2005a) suggest that annual livestock grazing in greater sage-grouse nesting habitats may adversely impact the next year's nesting success. Under Alternative A, the BLM manages to improve range conditions on Category I allotments and maintain M and C category allotments. Adams et al. (2004) identify grazing intensity and timing and duration of grazing as the most important factors in maintaining herbaceous cover for greater sage-grouse. The current focus of management and monitoring does not emphasize the protective cover of vegetation and litter required by greater sage-grouse. Therefore, management of livestock grazing under Alternative A is not anticipated to improve the quality or quantity of habitat for the greater sage-grouse.

To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative A avoids surface disturbance or occupancy within ¼ mile of occupied leks and avoidance of surface-disturbing and disruptive activities in suitable nesting and early brood-rearing habitats within 2 miles of occupied leks. Table 4-11 identifies the acreage protected by these buffers. Braun (2002) indicates that adverse impacts

to greater sage-grouse can occur within ¼- or ½-mile buffers and accordingly recommends no surface disturbance within 3 miles of occupied leks. No surface disturbance restrictions exist for greater sage-grouse winter habitats under Alternative A. No requirements to reduce noise levels of equipment exist under Alternative A. No restrictions on high profile structures in sagebrush obligate habitats exist under Alternative A, possibly fragmenting habitat because greater sage-grouse avoid some high-profile structures. Alternative A does not require implementing measures to prevent perching on overhead powerlines, potentially increasing predation from raptors and corvids on greater sage-grouse because of the increase in hunting opportunities. Current special designations within the planning area include the Raymond Mountain ACEC. No special designations emphasizing the greater sage-grouse currently exist under Alternative A.

Table 4-11. Summary of Select Conservation Measures and Potential Habitat Impacts for Special Status Species – Wildlife

Actions Affecting SSS-Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Proposed RMP)
Raptors – ½-mile buffer	BLM-Administered Surface	3,769	0	3,769	0
	BLM-Administered Mineral Estate	3,065	0	3,065	0
Raptors – ¾-mile buffer	BLM-Administered Surface	37,689	0	37,689	37,689
	BLM-Administered Mineral Estate	40,878	0	40,878	40,878
Raptors – 1-mile buffer	BLM-Administered Surface	74,599	0	74,599	74,599
	BLM-Administered Mineral Estate	71,531	0	71,531	71,531
Raptors – 1½-mile buffer	BLM-Administered Surface	0	245,978	0	0
	BLM-Administered Mineral Estate	0	249,154	0	0
Bald eagle winter roost area	BLM-Administered Surface	NSO	NSO	NSO	NSO
Bald eagle winter roost buffer or other suitable habitat outside of the 3-mile buffer (November 1 through April 1)	BLM-Administered Surface	1 mile	1 mile	1 mile	1 mile
Bald eagle active and alternative nest buffer (year-round)	BLM-Administered Surface	½ mile	½ mile	½ mile	½ mile
Bald eagle nest buffer (February 1 through August 15)	BLM-Administered Surface	½ to 1 mile	½ to 1 mile	½ to 1 mile	½ to 1 mile
Bald eagle nest buffer (foraging or concentration areas)	BLM-Administered Surface	2½ miles	2½ miles	2½ miles	2½ miles
Greater Sage-grouse Occupied Leks – ¼-mile buffer	BLM-Administered Surface	28,599	0	28,599	0
	BLM-Administered Mineral Estate	30,442	0	30,442	0

Table 4-11. Summary of Select Conservation Measures and Potential Habitat Impacts for Special Status Species – Wildlife *(Continued)*

Actions Affecting SSS-Wildlife	Acreage Type	Alternative A	Alternative B	Alternative C	Alternative D (Proposed RMP)
Greater Sage-grouse Occupied Leks – 0.6-mile buffer	BLM-Administered Surface	0	132,002	0	132,002
	BLM-Administered Mineral Estate	0	140,765	0	140,765
Greater Sage-grouse Nesting and Early Brood Rearing Habitats – 2 mile buffer	BLM-Administered Surface	702,360	0	702,360	0
	BLM-Administered Mineral Estate	745,623	0	745,623	0
Greater Sage-grouse Nesting and Early Brood Rearing Habitats – 3 mile buffer	BLM-Administered Surface	0	1,016,791	0	1,016,791
	BLM-Administered Mineral Estate	0	1,085,856	0	1,085,856
Habitat Fragmentation	BLM-Administered Surface	NA	Avoided to no more than 3% of available habitat	Avoided	Avoided
Permanent High Profile Structures with guywires or without perch deterrents	BLM-Administered Surface	NA	Prohibited within 1 mile of occupied habitat	Allowed within 1 mile of occupied habitat	Avoided within 1 mile of occupied habitat
Use of certified weed-free forage and feeds	BLM-Administered Surface	NA	Required	Recommended	Required
Use of certified weed-free seed and mulch	BLM-Administered Surface	NA	Required	Recommended	Required
Acres of forestland and woodland treated annually	BLM-Administered Surface	NA/NA	50/50	150/100	75/75

BLM Bureau of Land Management
NA not applicable
NSO no surface occupancy
SSS Special Status Species

Alternative A restrictions on surface disturbance or occupancy and disruptive activities around occupied greater sage-grouse leks are anticipated to provide some benefit to greater sage-grouse during sensitive periods; however, these restrictions may be insufficient to maintain or improve greater sage-grouse populations over the long term. In the long term, projected surface-disturbing and disruptive activities; management of fire, INNS, and livestock grazing; and existing proactive management actions under Alternative A may adversely impact the greater sage-grouse in the planning area.

Nongame (Raptors)

Nongame raptors are anticipated to be impacted by surface-disturbing activities resulting from mineral development, fire and fuels management, INNS, livestock grazing, and management actions for biological resources under Alternative A. The late winter, spring, and early summer periods, when courtship, nest construction, incubation, and early brooding periods occur, are considered more sensitive to disturbance because adult nongame raptors are more prone to abandon nests at these times (USFWS 2002). Constructing roads, powerlines, and other development facilities can contribute to loss and fragmentation of raptor habitats and ultimately impact diversity and abundance of raptor populations (USFWS 2002).

Surface disturbance will have localized adverse impacts on raptor prey species by temporarily and permanently disturbing habitats for small mammals and birds. Under Alternative A, surface disturbance impacts to raptors are minimized by designated buffer zones around raptor nests. Development infrastructure also impacts raptors. For example utility poles can provide perching and nesting structures for raptors, but also can result in mortality to raptors through collision and electrocution (APLIC and USFWS 2005). Under Alternative A, no activity or surface disturbance is allowed for up to a ¾-mile radius from any active raptor nest from February 1 through July 31 (February 1 through August 15 for peregrine falcons). In addition, within the Moxa Arch area, these restrictions apply for within 1 mile of ferruginous hawk nests. The distances and dates for no disturbance can vary under Alternative A based on topography, species, season of use, and other pertinent factors. The BLM protects approximately 116,057 acres surrounding known raptor nests under Alternative A.

Wind-energy facilities can be a source of mortality for raptors if raptors collide with wind tower blades. High mortality could result if wind towers are placed along a migration path or within nesting territories. Raptors, other birds, and bats sometimes collide with tall wind energy and utility infrastructures, including guy wires used for stabilization. Wind-energy facilities also could be a source of habitat loss and fragmentation, as well as human disturbance from construction and maintenance activities. Alternative A makes no decisions regarding wind-energy development. Alternative A does not contain specific restrictions for preventing habitat fragmentation in the planning area.

Special status raptors are impacted by wildlife-disturbing activities that contribute to habitat loss, fragmentation, and degradation. Such actions include, but are not limited to, INNS control, OHV use, and livestock grazing. For example, the anticipated continued spread of INNS in the planning area is expected to degrade habitat for raptors and their prey over the long term. Fire is a useful tool for managing certain desirable wildlife habitats; however, fire management under Alternative A is not specifically targeted to benefit raptors. Although improper livestock grazing can adversely impact habitat of raptors and their prey, Alternative A is anticipated to continue to improve rangeland productivity and, therefore, not adversely impact raptors. Because special status raptors use a variety of habitats, general habitat impacts to raptors are similar to those discussed elsewhere in this section and in the Vegetation and Fish and Wildlife Resources – Wildlife sections in this chapter. In the long term, the continued spread of INNS in the planning area, combined with the loss and fragmentation of raptor habitats by wind energy, mineral development, and associated infrastructure, are expected to degrade habitat important to raptors and their prey and, thus, may adversely impact these species over the life of the plan.

Nongame (Neotropical Migrants)

Many neotropical migrants breed and nest on BLM-administered lands and winter in the tropics (BLM 1992c). Although impacts to these species on their winter habitat are not subject to BLM management, impacts to breeding and nesting habitats from surface-disturbing activities, INNS control, fire and fuels management, and management actions for biological resources on BLM-administered lands are anticipated for neotropical migrants. Surface disturbance is anticipated to have localized adverse impacts to breeding and nesting habitats for neotropical migrants. Habitat impacts from surface disturbance may include temporary and permanent loss of breeding and nesting habitats due primarily to mineral development. Fragmentation and degradation of habitats for neotropical migrants also are anticipated from surface-disturbing activities and associated development. For example, neotropical migrants are expected to be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Because of the diverse species within the neotropical migrant category, additional impact analysis organizes these species into the following habitat guilds:

- Sagebrush and Shrubland Species – loggerhead shrike, sage thrasher, Brewer's sparrow, sage sparrow, and mountain plover
- Grassland Species – long-billed curlew and mountain plover
- Riparian and Wetland Species – yellow-billed cuckoo, trumpeter swan, white-faced ibis

Sagebrush and Shrubland Species – Similar to the greater sage-grouse, Brewer's sparrow, sage sparrow, and sage thrasher depend on sagebrush habitats. These species may use other shrubland types, particularly during the nonbreeding season. The loggerhead shrike uses more of a diversity of shrubland types, including sagebrush. Mountain plover may use shrublands for nesting. Therefore, measures to protect greater sage-grouse as discussed under Game Birds (greater sage-grouse) benefit all sagebrush and shrubland species. Adverse impacts to sagebrush habitats, as discussed for the greater sage-grouse, adversely impact these species. On the other hand, sagebrush and shrubland species may benefit from management actions in these communities including using prescribed fire to improve plant community health. In the long term, actions and allowable uses implemented under Alternative A are expected to benefit sagebrush and shrubland neotropical migrants within buffer areas established for the greater sage-grouse.

Grassland Species – Grasslands make up less than 1 percent of the planning area. Under Alternative A, there are no specific management actions for special status neotropical migrants that utilize grasslands. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, INNS control, fire and fuels management, and livestock and wildlife grazing. Under Alternative A, short- and long-term surface disturbance to grassland habitats on BLM-administered land in the planning area is expected.

The mountain plover often is found in association with prairie dog towns because they tend to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. These species also are impacted by management actions for white-tailed prairie dogs (see Nongame [Mammals]). In addition, mountain plover show a nesting preference to areas heavily grazed by livestock (BLM 2005l). Range management practices that favor uniform grass cover of taller grasses and a lack of bare patches reduce available mountain plover habitats (BLM 2005l).

Riparian and Wetland Species – Although there are no specific management actions for special status neotropical migrants that use riparian areas and wetlands, these species are impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Riparian and wetland areas also provide late brood-rearing habitats for greater sage-grouse; breeding and migratory stopover habitats for sensitive songbirds, waterbirds, shorebirds, and waterfowl; and breeding, foraging, and wintering habitat for bald eagles. Actions that result in the degradation or destruction of cottonwood-willow riparian habitats adversely impact the yellow-billed cuckoo (BLM 2003c). Under Alternative A, riparian areas are managed to preserve, protect, and restore natural functions. See the Vegetation – Riparian and Wetland Communities section in this chapter for a more detailed description of impacts to riparian and wetland communities.

While most surface-disturbing activities will not occur in riparian and wetland areas, these areas may be indirectly impacted due to erosion and an increase of sediment going into streams. Under Alternative A, short-term and long-term disturbance acreage from BLM actions are the highest of all alternatives (see Appendix M). Under Alternative A, surface-disturbing activities are avoided within 500 feet of riparian and wetland communities. Under Alternative A, the impacts to riparian and wetland communities associated with surface-disturbing activities are mostly indirect impacts and expected to be primarily adverse.

With proper grazing management and implementing rangeland improvement projects, the health of riparian and wetland areas can be sustained or improved. All alternatives involve management of livestock grazing in riparian areas. The degree and extent of grazing-related impacts to riparian and wetland areas over the long-term are expected to continue to improve. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on Category I and maintaining M and C category (see Glossary) grazing allotments. Grazing is used as a management tool in the Mike Mathias Wetlands at Wheat Creek Meadows to enhance wildlife values of the area. Use of fire-suppression chemicals, including foaming agents and surfactants, is not allowed within 200 feet of surface water sources. Application of chemicals and other INNS control methods could remove vegetation or cause soil disturbance, which can adversely impact riparian and wetland communities. Under Alternative A, appropriate methods of herbicide type and application are used in areas of riparian vegetation and wetland resources. Under Alternative A, management of water resources is performed according to existing regulations and with consideration for site-specific conditions. Management actions that strive to improve streams and conserve riparian and wetland areas generally result in long-term, beneficial impacts to special status neotropical migrants using these habitats.

Nongame (Mammals)

Impacts from surface-disturbing activities, INNS control, fire and fuels management, and management actions for biological resources are anticipated for special status nongame mammals. Surface disturbance is anticipated to have localized adverse impacts to special status nongame mammal habitats, including temporary and permanent loss of habitats. Fragmentation and degradation of habitats for special status nongame mammals also is anticipated from surface-disturbing activities and associated development.

It is important to note that some special status nongame mammal species, especially bats, may use more than one habitat type. However, because of the diverse species within the special status nongame mammal category, the impact analysis organizes these species into the following habitat guilds:

- Sagebrush and Shrubland Species – white-tailed prairie dog, black-footed ferret, pygmy rabbit, and Idaho pocket gopher
- Cave Species – long-eared myotis

Sagebrush and Shrubland Species – Similar to the greater sage-grouse, special status nongame mammals in this category depend on sagebrush habitats or other shrubland types. Therefore, measures to protect greater sage-grouse as discussed under Game Birds (greater sage-grouse) are anticipated to benefit all sagebrush and shrubland species. Likewise, adverse impacts to sagebrush habitats, as discussed for the greater sage-grouse, also would adversely impact these species. In the long-term, actions implemented under Alternative A are expected to benefit special status nongame mammals occupying sagebrush habitats within designated greater sage-grouse lek habitat buffers. Black-footed ferrets are associated with and depend on prairie dog colonies in the planning area. Reductions in prairie dog populations may affect the black-footed ferret; however, measurable adverse impacts to prairie dog populations are not anticipated by BLM actions under Alternative A.

Cave Species – Bats that use caves for roosting, maternity colonies, or hibernation could be impacted by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in steep terrain; the BLM restricts oil and gas activities on slopes greater than 25 percent and implements an NSO restriction for fluid minerals on slopes greater than 40 percent under Alternative A. Therefore, most cave habitats are expected to be protected under Alternative A; however, special status bats could be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Nongame (Amphibians)

The three amphibian species listed as sensitive in the planning area have historic observations, as well as a few recent observations (Lara Oles, Personal Communication). These species (northern leopard frog, boreal toad, and spotted frog) occur in riparian and wetland areas and could be impacted by activities in these communities. Beneficial impacts to these species are similar to the impacts described under Nongame (neotropical migrants) for this alternative. The Great Basin spadefoot may be impacted by activities in sagebrush communities, where this species occurs. Beneficial impacts to the spotted frog are similar to those described for greater sage-grouse for this alternative. Due to few recent observations of these species in the planning area, impacts are anticipated to be minimal.

Alternative B

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Management actions under Alternative B that may reduce impacts to grizzly bear habitats include seasonal closures of all big game crucial winter ranges, seasonal no surface disturbance restrictions around raptor nests, and limitations of surface disturbances around greater sage-grouse leks. These restrictions are more stringent than those implemented under Alternative A, potentially benefiting grizzly bear habitats more than Alternative A. Under Alternative B, the restrictions to minimize habitat fragmentation to less than 3 percent of available habitat could have the greatest beneficial impact to potential grizzly bear habitats than all other alternatives. The limitation depends on the amount of habitat available for grizzly bears in the planning area. All impacts would be calculated into percent ground disturbance, including vegetation treatments. The BLM derived the amount from looking at sagebrush habitat disturbance in the Moxa Arch project area, which is within the planning area. This provides a measurable goal to monitor habitat fragmentation.

Furbearing Animals

Under Alternative B, there are no specific management actions for Canada lynx; however, management actions that protect the habitats Canada lynx and their prey (primarily snowshoe hares) utilize are anticipated to result in beneficial impacts for Canada lynx. Under Alternative B, short-term impacts from forest treatments may temporarily adversely impact Canada lynx; however, over the long-term these treatments are anticipated to improve Canada lynx habitats and the habitats of its prey species. Alternative B retains old growth forest areas and, when possible, retains connectivity of existing or potential old growth areas, benefiting Canada lynx more than Alternative A. Buffer areas around raptor nests (a seasonal restriction) are larger under Alternative B than Alternative A, potentially resulting in greater beneficial impacts to Canada lynx where these habitats overlap. Greater restrictions on livestock grazing under Alternative B reduce the potential for adverse impacts to riparian and wetland areas more than Alternative A. Alternative B implements a ¼-mile buffer around riparian and wetland areas, excluding surface-disturbing activities. Overall, Alternative B is anticipated to result in greater beneficial impacts to Canada lynx habitats than Alternative A due to greater restrictions on surface-disturbing activities and a greater potential to improve habitats.

Predatory Animals

Under Alternative B management actions that protect the habitat gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting

human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves. Appendix A provides species specific conservation measures that incorporate and implement management actions identified through statewide programmatic documents.

Under Alternative B, seasonal no surface disturbance buffers around active raptor nests are larger than Alternative A, potentially having a greater beneficial impact to gray wolves than Alternative A. In addition to the areas of NSO for fluid minerals in Alternative A, Alternative B implements NSO restrictions for fluid minerals for known locations of special status plant species, including all locations of *Physaria dornii*, the Alfred Corum and Nancy Hill emigrant gravesites, and the Emigrant Springs/Dempsey area. Development of roads under Alternative B is primarily for oil and gas development. Surface disturbance from roads totals 2,112 acres in the short-term, slightly less than Alternative A. Alternative B avoids habitat fragmentation to no more than 3 percent of available habitat for special status species, as described under Trophy Game, and protects large, contiguous blocks of sagebrush, aspen, and mountain shrub communities. Alternative B identifies and preserves migration and travel corridors for big game and special status species. Alternative B seasonally closes all big game crucial winter range to motorized vehicle use. Based on less surface disturbance from roads and additional protections Alternative B implements for vegetation and big game, Alternative B is anticipated to result in greater beneficial impacts to gray wolves than Alternative A.

Game Birds (Greater Sage-Grouse)

Under Alternative B, estimated short- and long-term surface disturbance from BLM actions in the planning area are anticipated to result in less loss, degradation, and fragmentation of sagebrush habitats than under Alternative A. In addition, Alternative B includes specific management actions for protection from habitat fragmentation (including sagebrush habitats) on BLM-administered lands. Wind-energy development is precluded in areas of greater sage-grouse leks and potential nesting habitats under Alternative B.

Interim and (or) final reclamation of surface disturbance under Alternative B is required within 1 year of completing drilling activities; Reestablishment of healthy native plant communities based on preexisting composition or other species as identified in an approved management plan would occur under this alternative. A reclamation plan will be developed and approved prior to any surface disturbing activities being authorized. Monitoring of reclamation success would begin during the first growing season after seeding. Performance standards will be based on site-specific objectives for reclamation and will be identified in the approved reclamation plan. Alternative B offers more stringent requirements than Alternative A for the successful establishment of native habitats. Although surface disturbance results in short-term habitat loss and damage, the reclamation requirements of Alternative B help maintain long-term habitat quality in all habitat types, including sagebrush. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are less under Alternative B than under other alternatives, the associated adverse impacts to greater sage-grouse habitats also are expected to be less.

Alternative B restores a natural fire regime in the planning area and uses treatments to achieve measurable landscape-level objectives. In addition, Alternative B does not allow soil disturbance during suppression activities without consent of the authorized officer, thereby minimizing impacts to habitat quality. Use of a natural fire regime in fire-adapted ecosystems and reduction in fuel loads in the planning area may reduce the potential for catastrophic fire. Alternative B is anticipated to benefit the greater sage-grouse more than Alternative A.

Alternative B provides greater protection and minimizes impacts to soils, which minimizes the potential adverse impacts associated with the establishment and spread of INNS compared with Alternative A. In addition to the requirement for certified weed-free seed and mulch in the restoration project, Alternative B

requires the use of certified weed-free forage and feeds to prevent the establishment of new weed areas. These actions are anticipated to prevent the establishment and spread of INNS more under Alternative B than Alternative A, resulting in greater beneficial impacts to greater sage-grouse habitats under Alternative B.

Under Alternative B, the BLM implements greater restrictions and identifies more areas not available for livestock grazing. Improvements to range conditions focus on watershed, riparian, and wildlife values, but range-improvement projects do not occur within ½ mile of special status species unless the project will benefit the special status species. These restrictions under Alternative B are anticipated to benefit greater sage-grouse by increasing the quantity and quality of herbaceous plant species more than Alternative A.

To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative B prohibits rather than avoids surface disturbance or occupancy to protect associated nesting and early brood-rearing habitats compared to Alternative A. Alternative B protects greater sage-grouse winter habitats unlike Alternative A and uses BMPs to minimize impacts of continuous noise on species relying on aural cues for breeding. In addition, Alternative B manages sagebrush communities to enhance or maintain these communities, which will benefit greater sage-grouse more than Alternative A by reducing habitat fragmentation. Designation of white-tailed prairie dog colonies as ACECs under Alternative B increases protection of sagebrush habitats that will benefit greater sage-grouse and mountain plover. Alternative B also requires burying new low voltage utility lines and installing anti-perch devices on new high voltage utility lines, resulting in relatively little increase in predation on greater sage-grouse from raptors and corvids.

In the long term, the prohibition of surface disturbance or occupancy around greater sage-grouse leks, combined with the proactive management action establishing the white-tailed prairie dog ACECs and enhancing large, contiguous blocks of sagebrush habitat, are anticipated to protect sagebrush habitats. Under Alternative B, these restrictions and proactive management actions benefit greater sage-grouse to a greater extent than under Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire and fuels management, INNS control, OHV use, livestock grazing, and management actions for biological resources are anticipated to adversely impact raptors less under Alternative B than under Alternative A. Compared to Alternative A, restrictions around raptor nests are more extensive in areas under Alternative B; therefore, resulting in fewer direct impacts to nesting raptors. Buffers around all raptor nests would be 1½-miles wide. However, under Alternative B, the timing of these restrictions is specific to the species. For example, the restrictions apply for golden eagle nests from February 1 through July 15, or when the young fledge, while restrictions around northern goshawk nests are in place from April 1 through August 31. Alternative B protects more BLM-administered surface surrounding raptor nests compared to Alternative A, resulting in greater beneficial impacts to special status raptors.

Alternative B is anticipated to continue improving rangeland productivity and slowing the spread of INNS more than Alternative A. Alternative B identifies the least acreage suitable for wind-energy development (176,109 acres), thereby having the least potential to fragment sagebrush habitats. Wind-energy development projects are prohibited in locations of active raptor nests and migration corridors under Alternative B, benefiting raptors in the planning area. These actions are anticipated to protect and enhance more raptor habitats compared to Alternative A. Overall, the restrictions to surface-disturbing activities, fire suppression, livestock grazing, and INNS control under Alternative B are anticipated to protect more raptor habitats compared to Alternative A.

Nongame (Neotropical Migrants)

Under Alternative B, short- and long-term surface disturbance are anticipated to be less; therefore, associated adverse impacts to breeding and nesting habitats for neotropical migrants are anticipated to be less compared to Alternative A. Impacts to neotropical migrants from wind-energy development under Alternative B also are anticipated to be less than Alternative A.

Sagebrush and Shrubland Species – Measures to protect and reduce potentially adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland species.

Grassland Species – Although no specific management actions are identified under Alternative B for special status neotropical migrants utilizing grasslands, these species benefit by management actions treating woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Under Alternative B, less grassland habitat is expected to be impacted by BLM actions compared to Alternative A. Moreover, management actions under Alternative B are anticipated to protect more grassland and other vegetation types from habitat fragmentation compared to Alternative A. The mountain plover and long-billed curlew nest in areas with sparse vegetation are anticipated to be impacted by management actions for white-tailed prairie dogs (see Nongame [Mammals]). Greater restrictions on livestock grazing under Alternative B may adversely impact mountain plover by reducing available mountain plover habitats (i.e., heavily grazed areas and areas with bare patches).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants utilizing riparian and wetland areas are identified under Alternative B, these species are expected to be impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Riparian and wetland areas provide late brood-rearing habitats for greater sage-grouse; breeding and migratory stopover habitats for sensitive songbirds, waterbirds, shorebirds, and waterfowl; and breeding, foraging, and wintering habitats for bald eagles.

Under Alternative B, managing livestock grazing and wetland and riparian areas could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Alternative B identifies the Mike Mathias Wetlands at Wheat Creek Meadows as not available for livestock grazing, potentially benefiting special status neotropical migrants utilizing these areas. Furthermore, Alternative B excludes surface-disturbing activities within ¼ mile of riparian and wetland areas. These actions would ultimately result in a riparian system with increased vegetation and structural diversity, leading to an increase in abundance and diversity of neotropical migrants. Overall, restrictions on wind-energy development, less surface disturbance, and managing INNS control and livestock grazing under Alternative B are anticipated to protect and enhance more habitat and, thus, benefit special status neotropical migrants within the planning area more than Alternative A.

Nongame (Mammals)

Impacts from surface-disturbing activities, INNS control, fire and fuels management, livestock grazing, and management actions for biological resources under Alternative B are anticipated to be less for special status nongame mammals compared to Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions limiting habitat fragmentation and surface disturbance in sagebrush and shrubland communities. Measures to protect and reduce potentially adverse impacts to

greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland nongame mammal species. Less surface disturbance and less habitat fragmentation under Alternative B are anticipated to benefit special status nongame mammal species more than under Alternative A. In addition, prohibition of surface disturbance in and the ACEC designation of all white-tailed prairie dog colonies 100 acres or greater under Alternative B is anticipated to benefit species associated with these areas more than all other alternatives.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in steep terrain; the BLM prohibits surface-disturbing activities on slopes greater of 10 percent or greater under Alternative B and implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Therefore, more cave habitats are expected to be protected under Alternative B than under Alternative A; however, special status bats could be adversely impacted by wind-energy facilities, as discussed for special status raptors.

Nongame (Amphibians)

Potential impacts to the northern leopard frog, boreal toad, and spotted frog are commensurate with impacts to riparian and wetland habitats. The adverse impacts under Alternative B are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats and less than under Alternative A. Potential adverse impacts to the great basin spadefoot are commensurate with impacts to sagebrush habitats and are anticipated to be similar to those described for special status neotropical migrants and greater sage-grouse and less than Alternative A.

Alternative C

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Management actions under Alternative C that may minimize impacts to grizzly bear habitats are similar to Alternative A; however, avoidance of habitat fragmentation under Alternative C could benefit grizzly bear more than Alternative A.

Furbearing Animals

Under Alternative C, there are no specific management actions for Canada lynx; however, management actions that protect the habitats Canada lynx and their prey (primarily snowshoe hares) utilize are anticipated to result in beneficial impacts for Canada lynx. Alternative C allows the greatest annual sale quantity of 1,333 CCF, potentially adversely impacting Canada lynx more than the other alternatives; however, Alternative C retains old growth forest areas, similar to Alternative B, resulting in greater beneficial impacts than Alternative A. Buffers around raptor nests under Alternative C are smaller and encompass shorter timeframes compared to Alternative A, resulting in less potential beneficial impacts to Canada lynx. Management of livestock grazing under Alternative C is similar to Alternative A and has fewer restrictions than Alternative B. Buffers for exclusion of surface-disturbing activities in riparian and wetland areas under Alternative C are similar to Alternative A. Overall, Alternative C is anticipated to result in similar beneficial impacts to Canada lynx habitats as Alternative A.

Predatory Animals

Under Alternative C, there are no specific management actions for gray wolves; however, management actions that protect the habitats gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves.

Under Alternative C, seasonal no surface disturbance buffers around active raptor nests are smaller in size and shorter in timeframe compared to Alternative A. Alternative C implements the same NSO restrictions for fluid minerals as Alternative A, except the NSO restriction in *Physaria dornii* communities is removed under Alternative C. Development of roads under Alternative C is primarily for oil and gas development. Surface disturbance from roads in the short-term is the same as Alternative A. Alternative C avoids habitat fragmentation in habitat for special status species, resulting in greater beneficial impacts for gray wolves compared to Alternative A, but less than Alternative B. Alternative C does not specifically protect large, contiguous blocks of sagebrush, aspen, and mountain shrub communities, similar to Alternative A. Similar to Alternative B, Alternative C identifies migration and travel corridors for big game and special status species, but instead of preserving these areas as in Alternative B, Alternative C develops management for these areas. This management action benefits gray wolves more than Alternative A. Alternative C does not implement any seasonal closures on crucial big game winter range with regards to motorized vehicle use. Based on less surface disturbance from roads, less potential habitat fragmentation, and greater management of travel corridors, Alternative C is anticipated to result in greater beneficial impacts to gray wolves than Alternative A, but less than Alternative B.

Game Birds (Greater Sage-Grouse)

Estimated short-term surface disturbance from BLM actions under Alternative C is less than Alternative A (Table 4-1); however, estimated long-term surface disturbance is similar to Alternative A. Disturbance to sagebrush habitats is anticipated to be more than Alternative A. Under Alternative C, the greatest acreage suitable for wind-energy development is identified and could result in the greatest adverse impacts to greater sage-grouse. Alternative C manages vegetation resources to comply with the ESA, similar to Alternative A, both reducing habitat fragmentation less than Alternative B. Greater sage-grouse lek and nesting and early brood-rearing habitat avoidance buffers apply, similar to Alternative A. Alternative C does not impose greater sage-grouse winter concentration area restrictions, similar to Alternative A.

Under Alternative C, protection and mitigation to address surface-disturbing activities are similar to Alternative A, except BMPs are applied to limit soil erosion and related undesirable conditions, with an emphasis in areas with sensitive soil characteristics. Oil- and gas-related activities are restricted on slopes greater than 25 percent and there are NSO restrictions for fluid minerals on slopes greater than 40 percent. Reclamation of surface disturbance is similar to Alternative A. Overall, because surface disturbance and habitat loss, degradation, and fragmentation are similar under Alternative C compared to Alternative A, the associated adverse impacts to greater sage-grouse also are expected to be similar.

Alternative C does not restore a natural fire regime to fire-adapted ecosystems in the planning area; all wildland fires are suppressed under Alternative C. Prescribed fire and wildland fire use are precluded under Alternative C to meet fire and fuels management objectives. These actions may increase hazardous fuels, thereby increasing the risk of catastrophic fire, adversely impacting greater sage-grouse more than under Alternative A.

Alternative C is similar to Alternative A with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals to combat INNS. Alternative C recommends the use of

certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas. Impacts to greater sage-grouse from INNS under Alternative C are similar to Alternative A.

Under Alternative C, the BLM manages the grazing system and range improvements to maximize livestock grazing, meeting standards and guidelines. Under Alternative C, impacts to greater sage-grouse from livestock grazing are similar to Alternative A.

To minimize impacts to sagebrush habitats and the greater sage-grouse, Alternative C avoids surface disturbance to protect associated nesting and early brood-rearing habitats, but does not protect winter concentration areas, similar to Alternative A. Alternative C does not implement noise-level restrictions on equipment for species relying on aural cues for breeding, similar to Alternative A. Alternative C manages vegetation resources to comply with the ESA, similar to Alternative A, but reduces habitat fragmentation less than Alternative B. No white-tailed prairie dog colonies are designated ACECs under Alternative C, similar to Alternative A. The allowance of high-profile structures is a detriment to sagebrush obligate species due to raptors using these perches to hunt prey. Impacts to greater sage-grouse from predation by raptors and corvids would be similar to Alternative A. In addition, high-profile structures may fragment greater sage-grouse habitats due to this species avoidance of these structures, adversely impacting greater sage-grouse similar to Alternative A and more than Alternative B.

Restrictions on surface disturbance or occupancy proposed by Alternative C are anticipated to benefit greater sage-grouse during their sensitive nesting periods and in sensitive habitats, such as leks. Based on management actions regarding surface disturbance, habitat fragmentation, reclamation, and resource uses within the planning area, Alternative C is anticipated to have beneficial impacts to greater sage-grouse that are similar to, but slightly greater than, Alternative A.

Nongame (Raptors)

Surface-disturbing activities, fire and fuels management, INNS control, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors more under Alternative C than under Alternative A. Under Alternative C, restrictions around raptor nests would be less extensive, thereby benefiting nesting special status raptors less compared to Alternative A.

The potential short- and long-term surface disturbance from the development of wind-energy facilities on BLM-administered land under Alternative C is greater than any other alternative because Alternative C identifies the greatest acreage suitable for these activities. Alternative C specifically addresses habitat fragmentation, thereby having greater beneficial impacts to raptors than Alternative A.

Alternative C is anticipated to protect less raptor habitats through smaller buffers and shorter timeframes, thereby providing less benefit to special status raptors compared to Alternative A. Management actions for INNS control under Alternative C are anticipated to result in similar special status raptor habitat quality impacts as under Alternative A. Management actions for fire management under Alternative C could increase the potential for catastrophic fire, thereby resulting in greater adverse impacts to special status raptor habitats than Alternative A. Alternative C is anticipated to maximize livestock grazing while meeting standards and guidelines. Based on these actions, Alternative C is anticipated to result in greater adverse impacts to special status raptor habitats than Alternative A.

Nongame (Neotropical Migrants)

Under Alternative C, short-term surface disturbance is anticipated to be less than Alternative A, but long-term surfaced disturbance is anticipated to be similar to Alternative A over the life of the plan. Associated adverse impacts to breeding and nesting habitats for special status neotropical migrants are

anticipated to be similar to Alternative A. Wind-energy development acreage is potentially greater than any other alternative; therefore, impacts to special status neotropical migrants from wind-energy development under Alternative C are anticipated to be greater than under any other alternative.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to greater sage-grouse, as discussed under this alternative for Game Birds (greater sage-grouse), will benefit all sagebrush and shrubland species.

Grassland Species – Although no specific management actions for special status neotropical migrants that utilize grasslands are identified under Alternative C, these species are expected to benefit by management actions that treat woodland encroachment into grassland habitats where it is detrimental to grassland species. Grassland special status neotropical migrant species are expected to be impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock grazing. Alternative C impacts less and protects more grassland habitats from fragmentation compared to Alternative A. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species also are impacted by management actions for white-tailed prairie dogs (discussed under Nongame [Mammals]) under Alternative C, which does not specifically address surface-disturbing activities in white-tailed prairie dog habitats.

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants utilizing riparian areas and wetlands are identified under Alternative C, these species are expected to be impacted by other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Under Alternative C, riparian areas are managed similar to Alternative A. Long-term surface disturbance acreage under Alternative C is similar to Alternative A.

Under Alternative C, management of livestock grazing could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Alternative C identifies the Mike Mathias Wetlands at Wheat Creek Meadows as available for livestock grazing, potentially adversely impacting special status neotropical migrants in this area. Due to the greater emphasis on livestock values under Alternative C, beneficial impacts to special status neotropical migrants are expected to be less than under Alternative A. Overall, Alternative C provides the least protection to riparian and wetland communities, thereby resulting in the least beneficial impact to special status neotropical migrants of all alternatives.

Nongame (Mammals)

Surface-disturbing activities, INNS control, fire and fuels management, livestock grazing, and management actions for biological resources are anticipated to impact special status nongame mammals. Long-term surface disturbance under Alternative C is similar to Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions limiting habitat fragmentation and surface disturbance in sagebrush and shrubland communities. Measures to protect and reduce potentially adverse impacts to greater sage-grouse, as discussed under this alternative for Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland nongame mammal species. Surface disturbance in the short term under Alternative C is less than Alternative A, but in the long-term, is similar to Alternative A, resulting in impacts similar to Alternative A for sagebrush and shrubland species. Alternative C does not designate white-tailed prairie dog colonies of 100 acres or greater as ACECs.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be impacted by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are

often found in relatively steep terrain. Under Alternative C, the BLM restricts oil and gas activities on slopes greater than 25 percent, potentially protecting some cave habitats. Because acreage suitable for wind-energy development is greater under Alternative C compared to Alternative A, impacts to special status bats from wind-energy development under Alternative C are anticipated to be greater than Alternative A.

Nongame (Amphibians)

Potential impacts to the northern leopard frog, boreal toad, and spotted frog are commensurate with impacts to riparian and wetland habitats. The adverse impacts under Alternative C are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats and more than under Alternative A. Potential adverse impacts to the Great Basin spadefoot are commensurate with impacts to sagebrush habitats and are anticipated to be similar to those described for special status neotropical migrants and greater sage-grouse and similar to Alternative A.

Alternative D (Proposed RMP)

Trophy Game

The grizzly bear is not known to occur in the planning area, although it is possible for it to disperse to the planning area. If the grizzly bear did disperse to the planning area, it would most likely be found in the northern portion of the planning area where few BLM-administered lands occur. No adverse impacts are anticipated to occur to grizzly bear due to the rare occurrence of this species in the planning area and the limited management actions anticipated in potential grizzly bear habitats. Management actions under Alternative D may minimize impacts to grizzly bear habitats more than Alternative A. In addition, avoidance of habitat fragmentation under Alternative D may benefit grizzly bear more than Alternative A.

Furbearing Animals

Under Alternative D, there are no specific management actions for Canada lynx; however, management actions that protect the habitats Canada lynx and their prey (primarily snowshoe hares) utilize are anticipated to result in beneficial impacts for Canada lynx. Restrictions to surface disturbance around active raptor nests are less under Alternative D than under Alternative A. Under Alternative B, short-term impacts from forest treatments may temporarily adversely impact Canada lynx; however, over the long term, these treatments are anticipated to improve Canada lynx habitats and the habitats of its prey. Alternative D treats more acres annually than Alternative A and retains old growth forest areas similar to Alternative B.

Riparian areas are maintained, improved, or restored under Alternative D to enhance habitat forage conditions for livestock and wildlife and improve stream water quality. Restrictions to surface disturbance in riparian and wetland areas are similar to Alternative A. These management actions under Alternative D are anticipated to have greater beneficial impacts to Canada lynx than Alternative A.

Predatory Animals

Under Alternative D management actions that protect the habitat gray wolves and their prey (primarily elk) utilize are anticipated to benefit gray wolves in the planning area. Management actions limiting human activities, roads, corridors, and habitat fragmentation also will benefit gray wolves. Appendix A provides species-specific conservation measures that incorporate and implement management actions identified through statewide programmatic documents.

Under Alternative D, seasonal no surface disturbance buffers around active raptor nests are similar in size, but encompass a shorter timeframe compared to Alternative A. Alternative D implements the same

NSO restrictions for fluid minerals as Alternative A, but also implements an NSO restriction for fluid minerals on all known locations of special status plant species, except *Physaria dornii* populations. Development of roads under Alternative D is primarily for oil and gas development. Surface disturbance from roads is the same as Alternative A. Under Alternative D, management of habitat fragmentation is the same as Alternative C, resulting in greater beneficial impacts for gray wolves compared to Alternative A, but less than Alternative B. Alternative D protects large, contiguous blocks of sagebrush, aspen, and mountain shrub communities, similar to Alternative B. Similar to alternatives B and C, Alternative D identifies migration and travel corridors for big game and special status species, but instead of preserving these areas as in Alternative B, Alternative D works cooperatively to develop management for these areas to reduce conflicts. This management action benefits gray wolves more than Alternative A. Alternative D implements a seasonal closure on big game crucial winter range in the Slate Creek, Rock Creek, and Bridger Creek areas with regard to motorized vehicle use, the same as Alternative A. Based on less surface disturbance from roads, less potential habitat fragmentation, and greater management of travel corridors, Alternative D is anticipated to result in greater beneficial impacts to gray wolves than Alternative A, but less than Alternative B.

Game Birds (Greater Sage-Grouse)

Estimated short- and long-term surface disturbance from BLM actions under Alternative D are less than Alternative A (Table 4-1) and the second lowest of all alternatives. Alternative D reduces habitat fragmentation by maintaining or enhancing sagebrush communities, similar to Alternative B. Greater sage-grouse lek and nesting and early brood-rearing habitat avoidance buffers are larger than for Alternative A. Alternative D implements greater sage-grouse winter concentration area restrictions, similar to Alternative B, benefiting this species.

Reclamation requirements under Alternative D are similar to Alternative B and more stringent than under Alternative A for the successful establishment of preexisting native habitats. Although surface disturbance results in short-term habitat loss and damage, the reclamation requirements of Alternative D help maintain long-term habitat quality in all habitat types, including sagebrush, similar to Alternative B.

Similar to Alternative A, Alternative D suppression for wildland fires follows AMR; however, under Alternative D, wildland fire in high-density urban areas generally are suppressed, while wildland fire in low-density urban areas can be used to achieve resource objectives. Alternative D restores a natural fire regime to fire-adapted ecosystems in the planning area and uses prescribed fire to achieve measurable resource objectives. The anticipated reduction in fuel loads under Alternative D is anticipated to reduce the potential for catastrophic fire, benefiting greater sage-grouse nesting habitats.

Alternative D is similar to alternatives A and C with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals. However, Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas, similar to Alternative B. The use of certified weed-free seed and mulch is anticipated to slow the spread of INNS in the planning area, thereby benefiting greater sage-grouse habitats more than Alternative A.

Alternative D manages livestock grazing similar to, but more restrictive than, Alternative A and is less restrictive than Alternative B. Greater restrictions than Alternative A are anticipated have greater beneficial impacts to greater sage-grouse under Alternative D.

Similar to Alternative B, Alternative D maintains or enhances sagebrush communities in large, contiguous blocks, lessening the potential for habitat fragmentation and, thus, improving habitat conditions for greater sage-grouse. While Alternative D does not put a cap on the percentage of special

status species habitat fragmented (as in Alternative B), avoidance of fragmentation, similar to Alternative C, provides greater beneficial impacts to greater sage-grouse than Alternative A, which does not address habitat fragmentation. Alternative D protects lek, nesting, and early brood-rearing habitats similar to Alternative B, providing more beneficial impacts than Alternative A to greater sage-grouse by adding protections for winter habitats. No white-tailed prairie dog ACECs are designated under Alternative D, similar to alternatives A and C, resulting in less beneficial impacts to greater sage-grouse than Alternative B. Under Alternative D, restrictions on high-profile structures in sagebrush habitat result in less adverse impacts to greater sage-grouse than Alternative A, but more than Alternative B. Impacts to greater sage-grouse from predation by raptors and corvids would be similar to Alternative B. In addition, Alternative D provides greater beneficial impacts to greater sage-grouse with more restrictions on noise levels than Alternative A, but less than Alternative B.

Restrictions on surface disturbance or occupancy proposed by Alternative D are anticipated to benefit greater sage-grouse during their sensitive nesting and wintering periods and in sensitive habitats, such as leks. Alternative D provides greater protection to grassland and shrubland communities compared with alternatives A and C, but less protection than the maximum provided by Alternative B. Alternative D is anticipated to have greater beneficial impacts to greater sage-grouse than Alternative A, but less than Alternative B, due to increased protection from habitat fragmentation and more restrictive management actions regarding reclamation and resource uses within the planning area.

Nongame (Raptors)

Surface-disturbing activities, fire and fuels management, INNS control, livestock grazing, and management actions for biological resources are anticipated to impact special status raptors to a similar extent as Alternative A. Restrictions around raptor nests are less extensive under Alternative D due to shorter timeframes for some species, therefore benefiting nesting special status raptors less than under Alternative A. However, time periods can be adjusted based on specific needs of identified species under Alternative D.

Alternative D identifies the second highest acreage suitable for wind-energy development on BLM-administered land, thereby increasing the potential loss and degradation of special status raptor habitats compared to Alternative B. Alternative D benefits special status raptors more than Alternative A by managing to maintain and enhance large, contiguous blocks of sagebrush, aspen, and mountain shrub communities, thereby reducing habitat fragmentation.

Under Alternative D, protection and mitigation to address surface-disturbing activities is similar to Alternative A. Reclamation of surface disturbance is similar to Alternative B. The potential establishment and spread of INNS under Alterative D are expected to be less than Alternative A, resulting in fewer adverse impacts to special status raptor habitats than Alternative A. Alternative D places greater restrictions on wildland fire management than Alternative A. However, Alternative D uses wildland fire to meet management objectives potentially reducing hazardous fuel loads, resulting in greater beneficial impacts to special status raptor habitats than Alternative A. Livestock grazing under Alternative D has more beneficial impacts to special status raptor habitats than Alternative A, but less than Alternative B due to greater restrictions placed on the resource use.

Alternative D is anticipated to protect a similar amount of raptor habitat through buffers and species-specific timing restrictions, compared to Alternative A. Management actions for INNS control and fire and fuels management under Alternative D are anticipated to result in greater beneficial impacts to special status raptor habitat quality than under Alternative A.

Nongame (Neotropical Migrants)

Under Alternative D, short- and long-term surface disturbance are anticipated to be less than Alternative A; therefore, associated adverse impacts to breeding and nesting habitats for neotropical migrants are anticipated to be less than Alternative A. The acreage suitable for wind-energy development under Alternative D is approximately half that of Alternative C. Alternative D manages large, contiguous blocks of habitat for protection from habitat fragmentation, similar to Alternative B. Potential impacts to special status neotropical migrants from habitat fragmentation under Alternative D are, therefore, anticipated to be similar to Alternative B.

Sagebrush and Shrubland Species – Measures to protect and reduce potential adverse impacts to greater sage-grouse, as discussed under Game Birds (greater sage-grouse), benefit all sagebrush and shrubland species.

Grassland Species – Under Alternative D, no specific management actions for special status neotropical migrants that utilize grasslands exist. These species are impacted by actions in grassland habitats, such as surface-disturbing activities, reclamation, INNS control, and livestock and wildlife grazing. Under Alternative D, short- and long-term surface disturbance in grassland habitats is less than Alternative A. Similar to Alternative C, Alternative D avoids habitat fragmentation, protecting special status species' habitats more than Alternative A, which does not address habitat fragmentation. Alternative D could adversely impact grassland habitats and special status grassland species more than Alternative B. The mountain plover is often found in association with prairie dog towns. The mountain plover tends to prefer nesting areas with sparse vegetation cover. The long-billed curlew also nests in areas with sparse vegetation. Therefore, these species could also be impacted by management actions for white-tailed prairie dogs (described under Nongame [Mammals]).

Riparian and Wetland Species – Although no specific management actions for special status neotropical migrants using riparian and wetland habitats are identified under Alternative D, these species are expected to benefit from other biological resource management actions, particularly those pertaining to water and riparian and wetland habitats. Surface-disturbing activities are prohibited within 500 feet of riparian and wetland areas, similar to Alternative A. In general, the lower acreage of surface disturbance under Alternative D is anticipated to have a greater indirect beneficial impact to special status neotropical migrants than Alternative A, but less than Alternative B.

Livestock and wildlife tend to congregate at water sources, resulting in damage to critical riparian habitats. Alternative D protects and enhances riparian and wetland areas by managing livestock and grazing wildlife in these areas. Management actions could include fencing, developing alternative water supplies for livestock, herding, placing feed and mineral supplements away from water sources, and adjusting to pasture boundaries and season of use. Impacts from livestock grazing to special status neotropical migrants are anticipated to be similar to Alternative A. Alternative D reduces the potential spread of INNS through requiring certified weed-free seed, mulch, forage, and feeds, benefiting special status neotropical migrants in riparian and wetland areas. Overall, Alternative D provides greater protection to riparian and wetland communities, benefiting special status neotropical migrants more than alternatives A and C, but less than Alternative B.

Nongame (Mammals)

Impacts from INNS control, fire and fuels management, livestock grazing, and management actions for biological resources are anticipated to be similar under Alternative D for special status nongame mammals as under Alternative A. However, impacts from surface-disturbing activities are anticipated to be less under Alternative D compared to Alternative A. Short- and long-term surface disturbance acreage is approximately half that of Alternative A.

Sagebrush and Shrubland Species – Sagebrush and shrubland special status nongame mammal species are anticipated to benefit from management actions limiting habitat fragmentation and surface disturbance in sagebrush and shrubland communities. Measures to protect and reduce potentially adverse impacts to greater sage-grouse habitats, as discussed under Game Birds (greater sage-grouse), benefit special status sagebrush and shrubland nongame mammal species. Alternative D avoids habitat fragmentation similar to Alternative C, thereby providing greater benefit to special status nongame mammals compared to Alternative A. Alternative D results in less surface disturbance than alternatives A and C, but more than Alternative B. Although white-tailed prairie dog colonies of 100 acres or larger are not designated ACECs under Alternative D, this alternative does avoid disruptive activities that could result in the collapse of burrows in occupied white-tailed prairie dog colonies or complexes of 200 acres or greater, benefiting species associated with prairie dog colonies more than Alternative A.

Cave Species – Bats using caves for roosting, maternity colonies, or hibernation could be affected by surface-disturbing activities near caves, cliffs, or other rock features. Caves, cliffs, and rock outcrops are often found in relatively steep terrain. Alternative D implements similar restrictions as Alternative A to oil and gas activities, but also implements specific restrictions for sensitive soils and offers additional erosion protection to the Green River and Bear River basins and additional protection to soils across the planning area. The acreage identified as suitable for wind-energy development is greater under Alternative D than Alternative B, but less than Alternative C. This alternative is expected to result in less adverse impacts to cave species than Alternative A due to the additional protections on steep slopes and less surface disturbance.

Nongame (Amphibians)

Potential impacts to the northern leopard frog, boreal toad, and spotted frog are commensurate with impacts to riparian and wetland habitats. The adverse impacts under Alternative D are anticipated to be similar to those described for special status neotropical migrants that use riparian and wetland habitats and less than under Alternative A, but more than Alternative B. Potential adverse impacts to the Great Basin spadefoot are commensurate with impacts to sagebrush habitats and are anticipated to be similar to those described for special status neotropical migrants and greater sage-grouse and less than Alternative A.

4.4.8.3 Conclusion

Based on the projected disturbance and proposed actions summarized in Appendix M, Table 4-1, and the impacts described in this section, the following conclusions are made.

Alternatives B and D potentially disturb the least area both short- and long-term compared to alternatives A and C. The less short- and long-term surface disturbance to BLM-administered land and to vegetation types, the greater the beneficial impact to special status species in the planning area.

Alternatives B, C, and D provide management to reduce habitat fragmentation. Alternative B proposes to protect the most habitat followed by alternatives D and C. Alternative A does not propose to protect habitat from habitat fragmentation.

Alternative B is anticipated to provide the greatest protection for greater sage-grouse leks, nesting and early brood-rearing habitats, and winter habitats. Buffers around leks are similar for alternatives A, C, and D; however, Alternative D provides additional protection to winter habitats, similar to Alternative B. Other sagebrush-dependent species (e.g., Brewer's sparrow, sage sparrow, and sage thrasher) are anticipated to benefit from these protective management actions for the greater sage-grouse.

Alternative B protects the largest area around raptor nests. Alternatives A, C, and D protect similar, but less area, than Alternative B. Alternative A provides more protection than alternatives C and D due to a blanket seasonal restriction rather than seasonal dates based on species.

For other special status species, there are no specific management actions that directly address their protection or conservation. Therefore, adverse or beneficial impacts to special status species' habitats provided a more meaningful comparison of impacts among alternatives. Alternative B potentially provides the greatest beneficial impacts to special status wildlife habitats by imposing the most restrictions to minimize habitat loss, fragmentation, and degradation, and by including the most proactive actions to restore and enhance habitats. Alternatives A and C are anticipated to have the greatest adverse impacts to wildlife habitats and, therefore, the fewest beneficial impacts for special status wildlife. Alternative D generally provides an intermediate level of benefits. In the long term, the overall potential impact of alternatives to special status wildlife species in order of ascending adverse and descending beneficial impacts are B, D, C, and A.

4.4.9 Invasive Nonnative Species

Actions that could occur through implementing each alternative could be impacted by the spread of INNS. This section describes the impacts of each alternative on INNS in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as being beneficial or adverse.

The presence of INNS in the planning area is considered an adverse impact to most other resources. Actions that contribute to the introduction of INNS, the spread of existing INNS populations, or that avoid, reduce, or prohibit INNS control activities in the planning area also are considered adverse impacts.

Direct INNS impacts typically result from actions that disturb the soil or that otherwise create habitats (i.e., seedbed) for the establishment of INNS. Indirect impacts result from activities that avoid, reduce, or prohibit INNS control activities in the planning area. The transport (by wildlife, livestock, vehicles, wind, or water) of INNS seed, plant parts, propagates, pathogens, or other INNS to new locations, thereby expanding the distribution or increasing the rate of spread of INNS, is also considered an indirect impact.

4.4.9.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- INNS occur in greatest density in areas of past or current surface disturbance. Areas disturbed in the past and reclaimed may contain populations of INNS, but the abundance and distribution of these populations do not vary by alternative.
- Though there are exceptions, most INNS are less likely to invade relatively undisturbed and healthy natural vegetative communities.
- Roadways, trails, ROW, and corridors are major routes that can spread INNS through transport on motor vehicles and OHVs. INNS also can spread through watercourses, wind, and by wildlife and livestock movement.
- The amount of new surface disturbance associated with an alternative is a good index of potential impact by INNS. The larger the acreage of surface disturbance, the greater the adverse impact by INNS.
- Success of reclamation measures prescribed as a condition of development is unknown and could underestimate the potential impact from INNS, but is not expected to vary by alternative.

- Enforcement of restrictions related to recreation and OHV and dispersed travel can be assumed only if adequate funding and personnel are available to do the job.
- IM 2006-073 (BLM 2006c) establishes policy and guidance for use of certified weed-free seed and mulch to prevent the establishment of new INNS in restoration projects on public lands.
- Partners Against Weeds – An Action Plan for the BLM (BLM 1996), establishes a strategy to prevent weeds through cooperation with all partners. It outlines goals and specific actions to help prevent and control the spread of weeds. This action plan, along with any future updates and guidance, would be followed to control and prevent weed problems.
- Seeds from some INNS can remain dormant and viable in the soil for periods that exceed the 5-year division between short- and long-term impacts. Therefore, favorable site conditions may serve to reintroduce INNS to reclaimed sites without additional surface disturbance.
- The area evaluated for potential impacts includes the planning area and Uinta and Lincoln counties' weed-control districts.
- The acreage of long-term disturbance (Appendix M) includes facilities that cannot be reclaimed and that, in most cases, will not provide long-term habitats for INNS. For example, well pads, communication sites, powerlines, roads, wind-energy facilities, and other infrastructure will replace existing native vegetation with pervious or impervious surfaces for a period exceeding 5 years.
- Controlling and (or) eradicating INNS includes chemical, mechanical, biological, and cultural techniques.

4.4.9.2 Analysis of Alternatives

Allowable uses and management actions that could affect the spread and introduction of INNS include all surface-disturbing activities; concentrated livestock and native ungulate grazing; fire and fuels management; recreation, OHV use, and dispersed travel; and proactive management actions.

As INNS are affected by the alternatives, INNS can, in turn, impact other resources. Impacts of INNS on other resources are described in the Fire and Fuels Management section and in other biological resources sections. Spread of INNS also can fragment landscapes, thus creating more habitat parcels in which INNS can establish. Fragmented landscapes contain fewer intact ecosystems (Noss 1987).

Impacts Common to All Alternatives

The types of impacts projected to occur as a result of the various alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts resulting from surface-disturbing activities, fire and fuels management, concentrated livestock and native ungulate grazing, recreation, OHV use, dispersed travel, and proactive management actions are described under individual alternatives.

Though the application of INNS control described in the following alternatives focuses on control of plant pests, it is expected that impacts associated with the spread of nonnative animals, tree pathogens (such as western balsam bark beetle and various root diseases), diseases that affect humans as well as animals (such as the West Nile virus, bird flu, etc.), and other nonplant INNS also would be related to exposure and transport resulting from surface-disturbing activities, fire and fuels management, OHV use, recreation, and dispersed travel. Specific management actions for nonplant INNS are not identified in the following alternatives, but may have to be addressed in the foreseeable future. The Animal and Plant Health Inspection Service (APHIS) currently is the BLM's agent for controlling animal pests.

Because the acreage open to livestock grazing under all alternatives is similar and because all alternatives are managed according to the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a), the types of adverse and beneficial impacts from livestock and native ungulate grazing are expected to be similar among alternatives, and are anticipated to vary by alternative as a result of specific management actions. Short- and long-term beneficial impacts are anticipated from improvements to vegetative cover and plant vigor and control of INNS infestations that can occur under proper livestock grazing. Short- and long-term adverse impacts associated with livestock and native ungulate grazing are anticipated to occur primarily in animal concentration areas (e.g., water sources, trails, favored forage) and include transport of INNS seeds and propagates and disturbance of soil, creating habitats for the spread of INNS. Moreover, without a holding period to allow flushing, movement of livestock onto or within public lands can transport INNS seeds to new locations, thereby expanding INNS invasions. Kay (1995) indicates that high densities of native ungulates can reduce or eliminate shrub-seed production and impair recruitment of young shrubs. In addition, Hall and Bryant (1995) indicate that as vegetation stubble height is reduced, a shift in cattle preference and damage to vegetation can occur. The impacts described by Kay (1995) and Hall and Bryant (1995) are expected to adversely impact INNS; however, the impacts described by these studies are expected to remain uncommon and occur in isolated instances within the planning area under all alternatives due to grazing management. For more details, see the Livestock Grazing Management and Vegetation sections.

Alternative A

Surface-disturbing Activities. Surface-disturbing activities, from all actions listed in Appendix M, provide opportunities for the establishment and spread of INNS. BLM actions under Alternative A are anticipated to impact 214,120 acres and 144,673 acres in the short- and long-term, respectively, in the planning area over the life of the plan. No specific constraints on resource management to minimize habitat fragmentation are identified for Alternative A. Approximately 1,474,560 acres of federal mineral estate are currently administratively available to oil and gas leasing consideration under Alternative A.

Under Alternative A, surface-disturbing activities utilize existing soil surveys and observations to address protection and mitigation to minimize damage to soils. Surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines for surface-disturbing and disruptive activities. Surface-disturbing activities are developed to reduce the amount of disturbance on a site-specific basis. Oil- and gas-related activities are restricted on slopes greater than 25 percent and the BLM implements an NSO restriction for fluid minerals on slopes greater than 40 percent. Reestablishment of vegetation over disturbed soils would usually occur within 3 years of initial seeding. If vegetation establishment is unsuccessful within 3 years of initial seeding, follow-up seeding and nutrient testing will occur to determine if additional reclamation is needed.

Both short- and long-term impacts are anticipated from surface disturbance. Short-term impacts will occur during the 5 years following disturbance while soil is bare of vegetation and reclamation activities strive to stabilize the soil and revegetate the area. Long-term impacts will occur beyond the 5 years due to reclamation efforts that are not 100-percent effective in preventing INNS establishment. For example, the seeds and other parts of INNS plants that establish along roads are anticipated to be spread by cars and wind to other sites within the planning area throughout the life of the plan. In addition, some INNS seeds are able to lie dormant in the soil beyond the 5-year reclamation period. For the reasons stated, most adverse impacts are anticipated to be long term.

Fire and Fuels Management. Beneficial and adverse, direct and indirect, short- and long-term impacts from fire and fuels management are anticipated under all alternatives. By destroying or damaging INNS plants and seeds, beneficial impacts can be realized based on the timing and location of fire. Conversely,

adverse impacts from suppression activities that disturb soil and from fires that remove native vegetation and expose soil result in conditions that provide a seedbed for INNS establishment. The adverse impacts from fire and fuels management may be considered direct or indirect because the impact(s) may or may not occur immediately. Under Alternative A, wildland fire suppression will follow the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for areas identified where fire is not desired or in areas where fire can be used as a management tool. Alternative A limits soil disturbances resulting from heavy equipment to protect cultural and natural resources, which will also protect areas from INNS. Fire suppression under Alternative A is anticipated to have adverse, short-, and long-term impacts within the planning area.

Alternative A uses prescribed fire to manipulate vegetation in areas identified for treatment by the range, forestry, and wildlife programs. Under Alternative A, prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role in the ecosystem to meet fire and fuels resource management objectives. This action could result in a beneficial or adverse impact with regard to INNS, depending on whether the result is an improvement to habitat quality or an increase in INNS.

Livestock Grazing. The impacts of livestock grazing on INNS from all alternatives are anticipated to result in a mix of beneficial and adverse impacts. The entire planning area currently is open to livestock grazing with the exception of a few small parcels. Temporary nonrenewable permits have not been issued for unalloted parcels. Under Alternative A, grazing system and range improvements are implemented to achieve management objectives for livestock and serve as a primary means for improving range conditions on Category I and maintaining M and C category grazing allotments (see Glossary). Improvement in the health of rangelands reduces the opportunities that INNS have to invade and colonize an area.

Recreation, OHV Use, and Dispersed Travel. Indirect, adverse, short-, and long-term impacts from transportation of materials, people, and vehicles into and out of the planning area occur at recreational sites, trailheads, trails, and transportation routes. INNS are established in some of these areas and their seeds are spread to other areas by vehicles and people. Due to the permanent nature of most recreational sites, trails, and transportation routes, most associated adverse impacts are anticipated to be long term. The resulting impact is the spread of INNS into new areas within the planning area. Restrictions to off-road, road, and other travel corridor use will be initiated, and a comprehensive inspection and decontamination procedure for animals, equipment, materials, and vehicles will need to be adopted to completely halt the spread of INNS onto and within BLM-administered lands. However, some management actions (i.e., the use of certified weed-free seed and mulch) are available under this alternative to lessen the threat of INNS from being introduced and established via seed. Because Alternative A contains no management actions to reduce or prohibit the introduction and transport of new INNS infestations, adverse, short-, and long-term impacts are anticipated to continue.

Proactive Management Actions. Management of INNS that already occur within the planning area includes the application of chemicals and other INNS control methods to remove undesirable species. Under Alternative A, protection of waters, riparian vegetation, wetlands, and special status plant species requires that chemical herbicide buffers are: 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand applications. Application of chemicals in other areas is considered on a case-by-case basis in coordination with the BLM authorized officer. Chemicals must be mixed a minimum of 500 feet from riparian areas, water sources, floodplains, and known special status plant species populations. With greater distance from sensitive resources that chemicals can be applied, either by aerial, vehicle, or hand application, INNS control may be reduced if they occur in those sensitive areas.

Alternative B

Surface-disturbing Activities. Under Alternative B, there are 104,338 acres (approximately 51% less) short-term and 47,232 acres (67% less) long-term disturbance anticipated in the planning area from BLM management actions compared to Alternative A. Under Alternative B, approximately 45-percent less acreage of federal mineral estate is administratively available to oil and gas leasing compared with Alternative A, with the majority (84%) subject to the terms and conditions of standard lease plus major constraints. The restrictions on habitat fragmentation and the fewer disturbed acres relative to Alternative A that are anticipated would minimize the potential adverse impacts associated with the establishment and spread of INNS under Alternative B.

Under Alternative B, all surface-disturbing activities within the planning area require soil surveys and analysis, which may add to the knowledge of where existing INNS infestations occur. Alternative B requires consolidation of road networks and equipment placement to reduce surface disturbance. Similar to Alternative A, surface-disturbing activities comply with current Standard Practices and Wyoming BLM Mitigation Guidelines; however, surface-disturbing activities are prohibited in areas of sensitive, highly erosive, and excessively steep slopes of 10 percent or greater without adequate mitigation developed for site-specific erosion control. In addition, disturbances on soils with fragile steep slopes, chemical and biological crusts, and soils with low reclamation potential characteristics are prohibited under Alternative B. Alternative B provides greater protection and minimizes impacts to soils, which reduce the potential for creating suitable conditions for, and the adverse impacts associated with, the establishment and spread of INNS compared with Alternative A.

To reduce the possibility of INNS establishment, interim reclamation of oil and gas surface disturbance occurs within the first planting season after the rig is moved off location. Final reclamation of well locations will begin within the first planting season once the well has been plugged. For surface disturbance that occurs under authorized activities other than oil- and gas-related operations, reestablishment of healthy native plant communities based on preexisting composition or other species as identified in an approved management plan would occur. A reclamation plan will be developed and approved prior to any surface disturbing activities being authorized. Monitoring of reclamation success would begin during the first growing season after seeding. Performance standards will be based on site-specific objectives for reclamation and will be identified in the approved reclamation plan. Appropriate reclamation standards are developed at the project level. The sooner reclamation occurs, the sooner greater benefits to other resources will be achieved by reducing the spread of INNS. In addition, Alterative B offers more stringent requirements than Alternative A for the successful reestablishment of native plant communities based on preexisting species composition or other species as identified in an approved management plan. Direct and indirect adverse impacts associated with the potential establishment and spread of INNS under Alterative B are expected to be less for this alternative than under Alternative A.

Fire and Fuels Management. Alternative B is similar to Alternative A for fire-suppression actions, except Alternative B does not allow soil disturbance without the consent of the authorized officer. Under Alternative B, prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role in the ecosystem to meet fire and fuels management objectives the same as Alternative A, only this action will be based on acre thresholds and areas found in the approved *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f) for the planning area. As with Alternative A, the use of prescribed fire as a management tool could result in beneficial or adverse impacts with regard to INNS, depending on whether the result is an improvement to habitat quality or an increase in INNS. Therefore, adverse impacts associated with INNS from Alternative B will be similar to those for Alternative A.

Livestock Grazing. Alternative B generally allows livestock grazing over the same area identified under Alternative A; however; areas identified for the protection of specific resource values could be unavailable for livestock grazing under Alternative B. Alternative B provides the most aggressive approach to the management of BLM grazing lands. By making more areas unavailable for livestock grazing, this alternative reduces the potential spread of INNS relative to Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative B, decreases in recreational, OHV use, and dispersed travel opportunities will result correspondingly in the decreased transport of INNS seed into and among BLM-administered lands. Travel and use restrictions help lessen the adverse impacts resulting from INNS seed transport. Management actions under Alternative B are anticipated to have less adverse impacts to most other natural resources relative to Alternative A, and the least relative to other alternatives.

Proactive Management Actions. Under Alternative B, the distance from sensitive resources where appropriate application of chemicals is allowed is greater than under Alternative A. Since this distance is greater than Alternative A, Alternative B would likely be less effective on INNS control and, therefore, potentially have greater impacts.

In addition to the requirement for certified weed-free seed and mulch in restoration project, Alternative B also requires the use of certified weed-free forage and feeds for livestock supplements to prevent the establishment of new weed areas. This action is anticipated to have more beneficial impacts in preventing the establishment and spread of INNS relative to Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, 172,967 acres short-term and 144,467 acres long-term disturbance are anticipated in the planning area from BLM management actions. Alternative C is similar to Alternative A with regard to potential surface disturbance associated with mineral resources. Under Alternative C, protection and mitigation to address surface-disturbing activities are similar to Alternative A. Oil- and gas-related activities are restricted on slopes greater than 25 percent and NSO restrictions for fluid minerals on slopes greater than 40 percent are also in place under Alternative C. Reclamation of surface disturbance is the same as for Alternative A. Direct and indirect adverse impacts associated with the potential establishment and spread of INNS under Alterative C are expected to be similar to Alternative A due to the similar long-term surface disturbance anticipated under Alternative C.

Fire and Fuels Management. Under Alternative C, all wildland fires are suppressed in the planning area. No soil disturbances are allowed during fire suppression from heavy equipment unless private or public habitable structures or industrial facilities are at risk. Prescribed fire and wildland fire use are not used to reintroduce fire to its natural role in the ecosystem. By restricting the use of heavy equipment, some direct impacts are reduced. However, by not using prescribed fire, which could be used as a tool for INNS control and habitat improvement, Alternative C has the greatest potential to cause direct and indirect impacts associated with the spread and establishment of INNS of all alternatives.

Livestock Grazing. Alternative C is similar to Alternative A, except livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing, as well as other public lands in the planning area. Grazing system and range improvements are implemented to maximize livestock grazing. Alternative C has the greatest potential to cause direct and indirect impacts associated with the spread and establishment of INNS via livestock activities compared with all other alternatives.

Recreation, OHV Use, and Dispersed Travel. Alternative C is similar to, but less restrictive than, Alternative B. Limited off-trail travel is allowed to perform necessary tasks, as long as it does not cause resource damage or create new trails. Travel and use restrictions help lessen the adverse impacts resulting from INNS seed transport. The anticipated soil disturbance, vegetation removal, and transport of INNS

under Alternative C from OHV use are anticipated to produce less indirect and adverse impacts compared to Alternative A.

Proactive Management Actions. Alternative C is the same as Alternative A with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals. Alternative C also recommends the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds for livestock to prevent the establishment of new weed areas, resulting in greater beneficial impacts than Alternative A.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, short-term and long-term disturbances anticipated in the planning area are the second lowest of all alternatives. Alternative D allows oil and gas leasing on approximately 1,400,000 acres of federal mineral estate (slightly less than under Alternative A).

Under Alternative D, protection and mitigation to address surface-disturbing activities are the same as Alternative C. Alternative D utilizes existing road networks and equipment to reduce additional surface disturbances, impacts, and fragmentation of habitats. Transportation and (or) travel management plan(s) for large-scale development activities are required to be completed for each project proponent or unit operator prior to authorizing additional surface-disturbing activities under Alternative D. Oil and gas activity restrictions are the same as Alternative A. In addition, surface-disturbing activities are avoided in areas of sensitive, highly erosive, and excessively steep slopes of 20 percent or greater, and any disturbance in these areas would require additional consideration of slope stabilization and erosion control techniques. Disturbances on soils with fragile steep slopes, chemical and biological crusts, and soils with low reclamation potential characteristics are avoided. Disturbances in these types of areas require erosion, revegetation, and restoration plans. Reclamation of surface disturbance is the same as for Alternative B. Overall, direct and indirect adverse impacts associated with the potential establishment and spread of INNS under Alterative D are expected to be less than under alternatives A and C due to less surface disturbance anticipated in the planning area, and less than Alternative B because of more flexibility in controlling INNS.

Fire and Fuels Management. Under Alternative D, wildland fire suppression follows the AMR in the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f), which provides for human health and safety and minimizing loss of property and threats to other surface owners. The plan also allows for achievement of resource objectives in areas where fire can be used as a management tool (similar to Alternative A, but maximizing the use of wildland fires to achieve management objectives). Soil disturbances on public lands are not allowed without consent from the BLM authorized officer. Similar to Alternative B, prescribed fire and wildland fire use could be used to reintroduce fire back into its natural role in the ecosystem, and would result in similar impacts.

Livestock Grazing. Alternative D is similar to Alternative A, except livestock grazing on small, isolated tracts currently not permitted or leased for grazing, as well as on other public lands in the planning area, is allowed as a discretionary action. Range improvements are implemented to achieve management objectives for livestock the same as Alternative A. Under Alternative D, there is greater land protection, and, therefore, direct and indirect adverse impacts associated with the establishment and spread of INNS under Alternative D are expected to be less than with Alternative A.

Recreation, OHV Use, and Dispersed Travel. Under Alternative D, motor vehicle travel and OHV use are limited to existing roads and trails similar to Alternative A; however, Alternative D implements greater restrictions to potential off-road travel. Travel and use restrictions under Alternative D lessen the adverse impacts resulting from INNS seed transport compared to Alternative A. Anticipated soil disturbance, vegetation removal, and transport of INNS under Alternative D from OHV use will be similar, but slightly less than, Alternative A.

Proactive Management Actions. Alternative D is the same as alternatives A and C with regard to allowable distances from sensitive resources for aerial, vehicle, and hand application of chemicals. However, Alternative D requires the use of certified weed-free seed and mulch in restoration projects and the use of certified weed-free forage and feeds to prevent the establishment of new weed areas, potentially preventing the spread of INNS more than alternatives A and C, and the same as for Alternative B.

4.4.9.3 Conclusion

The following conclusion is based on meaningful differences in short- and long-term disturbance acreage; surface disturbance and prescribed fire management on highly erosive soils and slopes greater than 25 percent; use of certified weed-free seed, timing, and reseeding requirements in reclamation of disturbed areas; management of livestock, including areas unavailable for livestock grazing for resource protection; OHV use limitations; and management of soil disturbance during fire suppression activities: potential adverse impacts from Alternative A are anticipated to be the most adverse, followed by alternatives C and B, with impacts from Alternative D anticipated to be the least adverse with regard to the introduction and spread of INNS.

4.5 Heritage Resources

4.5.1 Cultural Resources

Cultural resources are fragile, nonrenewable evidence of past human history and heritage on the landscape. They are public resources entrusted to the BLM for protection and interpretation, providing a context for present-day land use decisions. Actions that could occur through implementing each alternative could impact cultural resources in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as being beneficial or adverse. NHT impacts are analyzed within a subsection of the cultural resources section because of the special nature of trails management in contrast to most archeological and other historic resources. Native American concerns are briefly identified in this section and discussed in more detail in the Native American Concerns section of the chapter.

Direct impacts to cultural resources, other than historic trails, from RMP alternatives typically result from actions that disturb the soil or physically alter, damage, or destroy all or part of a resource; alter characteristics of the surrounding environment that contribute to resource significance; introduce visual or audible elements out of character with the property or alter its setting; or result in neglect of the resource to the extent that it deteriorates or is destroyed. For example, surface-disturbing activities are considered an adverse direct impact because the resource is nonrenewable; once it has been disturbed, the potential for collecting or preserving meaningful data are lost. For the purposes of this analysis, actions resulting in data collection and preservation of cultural resources other than trails could be considered beneficial impacts but, in fact, are neutral or nonadverse impacts, as the action merely maintains the status quo. A truly beneficial impact to cultural resources enhances values, such as construction of interpretive signs. Indirect impacts to cultural resources result from project-induced increases or decreases in activity in the planning area. For example, constructing a recreational facility may increase visitor use, but could result in indirect impacts to previously undisturbed cultural resources.

NHTs are subject to the same range of direct and indirect impacts as archeology and historic resources. For example, the construction of a recreational facility may increase visitor use, which could result in indirect impacts to previously undisturbed trail segments. However, NHTs are a special case in that data collection and preservation actually do provide beneficial impacts. Recreation, in particular, is a complex issue, as actions taken to preserve historic values can have both beneficial and adverse impacts for heritage tourism and trail enthusiasts. Historic properties like NHTs and other sites from the historic period are managed to preserve their historic values, which commonly may include integrity of location, association, and setting as defining characteristics that make them eligible for inclusion in the NRHP, and may also involve integrity of design, workmanship, materials, and feeling, if present. Integrity of location and association are present in the physical remains of a property, if the property is in the place where it was constructed or where the historic event occurred and is sufficiently intact to convey a direct link to the historic event. Setting is the physical environment of a historic property that refers to the character of the place in which the property played its historical role. When setting is an important aspect of integrity that defines the character of a historic property, the BLM manages the landscape beyond the property's physical boundaries through appropriate management actions. All activities that have the potential to affect historic properties are analyzed and managed with consideration of the properties' historic values, which generally include physical traces and settings for NHTs. The management actions proposed in the alternatives reflect BLM's basic approach to preservation of historic values retained by designated NHT classes. All undertakings are analyzed for their potential effects on NHTs with consideration of these management actions, pursuant to Section 106 of NHPA, which may require that specific projects consider effects in trail settings beyond the distances specified in the selected alternative.

The duration of a disturbing element or activity can be considered as short-term or long-term. A pipeline construction corridor is a short-term disturbance, as normal reclamation ultimately stabilizes the soil. A disturbance continuing beyond 5 years is considered long-term. However, as a practical matter, there is little difference between short- and long-term impacts from surface disturbance. Once a disturbance occurs to a cultural resource, the alteration is permanent. Restoration occasionally can be done in some cases, and stabilization can halt additional deterioration, but once a portion of a cultural resource is damaged, it rarely can be repaired.

For all agency undertakings with the potential to adversely impact historic properties (i.e., cultural resources that are eligible for, or listed in, the National Register of Historic Places [NRHP]), the BLM complies with Section 106 of the NHPA. Section 106 compliance typically includes a cultural resources inventory and evaluation of any resources found. If historic properties are present, the BLM consults with the State Historic Preservation Office (SHPO), interested Native American tribes, and other interested parties in developing mitigation measures for adversely affected properties. Under all alternatives, the BLM continues its obligation to conduct government-to-government consultation with interested tribes regarding the sensitive resources of the planning area (see Maps 28 through 31).

4.5.1.1 Methods and Assumptions

Archeology and Historic Resources

Methods and assumptions used to analyze impacts to archeology and historic resources include the following:

- Cultural resources will continue to be found throughout the planning area.
- All surface-disturbing activities could adversely impact cultural resources.
- Wildland and prescribed fire could damage rock art sites and sites comprising combustible materials.
- Protection for all cultural resources will occur in accordance with federal laws and BLM regulations and agreements, regardless of whether the resources are specifically identified in the RMP.
- Adverse impacts to cultural resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, the projected numbers for short-term surface disturbance are used to quantify impacts to cultural resources.
- The intensity of surface disturbance by alternative, as identified in Appendix M, equates to levels of development and, in turn, increased access to public lands.

National Historic Trails

Methods and assumptions used in the NHTs impact analysis include the following:

- Protection of NHTs and related sites occur in accordance with federal laws and BLM regulations and agreements, regardless of whether the trails are specifically identified in the RMP.
- Direct and indirect impacts can result from a variety of natural and human-caused events, such as those that physically alter, damage, or destroy all or part of the trail; improve access, bringing increased use to an area and altering characteristics of the surrounding environment that contribute to the trail's importance; the introduction of visual or audible elements out of character with the trail or that alter its setting, and neglect of the trail to the extent that it deteriorates or is destroyed.

- The intensity of surface disturbance by alternative, as identified in Appendix M, equates to levels of development and, in turn, increased access to public lands.
- BLM looks favorably at opportunities to cooperate with private landowners to minimize or eliminate disturbance to NHTs.
- Recognizing that historic trails often comprise numerous routes rather than a single trace, all protective zones begin at the outer edges of trails, rather than a centerline, which is difficult to define.
- Certain projects, due to size or topography, may require consideration of visual intrusions into the setting beyond the foreground or middleground zones to comply with Section 106 of the NHPA.

4.5.1.2 Analysis of Alternatives

As cultural resources are impacted by management actions under each alternative, actions for cultural resources can, in turn, impact other resources. For example, constraints placed on surface disturbance on or around specific cultural sites may impact desired actions under another resource. The impacts of cultural resources on other resource topics (e.g., physical, biological, fire and fuels management, etc.) are discussed under the appropriate impacted resources.

Archeology and Historic Resources

Impacts Common to All Alternatives

The types of impacts projected to occur to cultural resources because of the various alternatives are similar; however, the intensity of the impacts is anticipated to vary. Therefore, impacts to cultural resources from surface-disturbing activities, such as minerals development, ROW, facilities development, OHV use, recreational, fire and fuels management, and proactive cultural resource management actions are described under individual alternatives. Essentially, any activity that creates or has the potential to create surface disturbance, regardless of the resource program to which it may be associated, can cause potential impacts to cultural resources. Conversely, public use of cultural resources, such as NHTs, that extend across the checkerboard land pattern area could adversely impact the private land owners due to impacts such as increased erosion on trails or access routes, livestock/recreational user conflicts, and increased trash and other debris.

Under all alternatives, all cultural properties will be categorized according to the six use categories defined in BLM Manual 8110 (BLM 1998c): Scientific Use, Conservation Use, Public Use, Traditional Use, Experimental Use, and Discharged from Public Use.

For all alternatives, management of fish and wildlife resources could have an indirect beneficial impact on cultural resources if improving fisheries and other habitats enhance the availability of traditional resources. The situation is similar for soils management, in which reducing erosion and limiting erosion of highly erosive soils help preserve archeological sites. Management of wildland and prescribed fire can directly and adversely impact cultural resources by direct disturbance from suppression, thermal effects on rock art panels, or burning sites composed of combustible materials, such as wickiups, corrals, or historic sites. Indirect impacts derive from new exposures of cultural materials, making them available for illicit collection or disruption by erosion. Beneficial impacts are possible, in that previously obscured sites are exposed and made available for recording and further management.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact cultural resources. Under Alternative A, the projected surface disturbance

from BLM actions results in the highest disturbance acreage (refer to Table 4-1). The distinction between short- and long-term disturbance is not useful for cultural resources because once a site is disturbed, impacts cannot be remediated as a stream or vegetation can be restored. Moreover, the impacts to cultural resources from surface disturbance projected for Alternative A are anticipated to be primarily adverse. The net potential adverse impact to cultural resources is limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to historic properties prior to any disturbance. The relative amount of surface disturbance projected for each alternative defines the level of potential to impact cultural resources. In those cases in which an accommodation cannot be made, consultation between the BLM and the SHPO and affected interests takes place to develop and implement a treatment plan to mitigate adverse impacts to historic properties. While the treatment plan may specify data recovery, other actions, such as planned excavation, detailed recording and mapping, Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation, or interpretation are among the variety of techniques that can be used for mitigation, depending on the type of site and the nature of the potential adverse impacts.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection or beneficial impacts for cultural resources. For example, under Alternative A, surface-disturbing activities are reviewed on a case-by-case basis and an NSO restriction for fluid minerals is implemented on slopes greater than 25 percent without permission of the authorized officer. Management of the Bridger Antelope Trap specifies an NSO restriction for 480 acres of fluid minerals. Management plans will be developed for eligible sites, providing protection or mitigation plans for adverse impacts. Eligibility will be decided on a case-by-case basis. Specific sites have management prescriptions: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock; and Alfred Corum emigrant gravesite. Inventories are necessary prior to all surface-disturbing activities, usually associated with the NEPA process. These management actions result in beneficial impacts to cultural resources. Therefore, additional protections for cultural resources under Alternative A are less than all other alternatives, except Alternative C.

Land Disposal and Acquisition. Disposal of BLM-administered surface land can result in both beneficial and adverse impacts to cultural resources. The results of the survey required under Section 106 of the NHPA causes a beneficial impact to cultural resources because it generates data that promote further understanding of cultural resources in the planning area. However, if historic properties are identified during the inventory, it could result in an adverse impact because once in private ownership, there are no protective measures for cultural resources. Land-tenure adjustment is classed as an adverse impact (in terms of Section 106) for that reason. Impacts to historic properties need to be mitigated by application of a treatment plan developed through consultation between the BLM and the SHPO. In other words, cultural resource issues have to be resolved prior to any changes in land ownership. Under Alternative A, acreage of BLM-administered surface identified for disposal by sale equals that under Alternative C and is more than under Alternative D.

Access. General development (e.g., recreational facilities and mineral development) and OHV use can provide access to remote cultural resource locations leading to adverse impacts related to traffic, vandalism, and erosion. For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, the highest amount of development and increase in access occurs under Alternative A and results in an indirect adverse impact to cultural resources. Because adverse impacts to historic properties must be mitigated prior to authorizing an action, the degree of adverse impact is lessened.

Increased visitor use through OHV use and improved access can have both beneficial and adverse impacts on cultural resources. For example, archeological sites are protected when there are access restrictions,

but may be exposed to vandalism or other impacts if multiple uses increase, including exploration for extractive resources (e.g., mining) or an increase in recreational opportunities. However, lack of access also can adversely impact the use of traditional cultural resources.

OHV use on public lands, under all alternatives, indirectly impacts cultural resources. The impacts of OHV use are primarily anticipated to be adverse, indirect, and to occur in the areas limited to designated roads and trails for OHV use. Although OHV use currently is restricted in some areas, and use is limited to existing roads and trails, new trails are constantly being created and becoming part of the "existing" designation.

Alternative A does not preclude granting an ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Alternatives B and D do restrict ROW placement through these sites.

Proactive Management Actions. Under Alternative A, an NSO restriction for fluid minerals is in place for those cultural sites within the 480-acre area of the Bridger Antelope Trap. There are no specific VRM management policies for this site. All historical, archeological and cultural sites eligible for or listed on the NRHP will be protected or impacts will be mitigated. Management plans will be developed for sites eligible for or listed on the NRHP, on a case-by-case basis. Management prescriptions exist for Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, and the Alfred Corum emigrant gravesite. These management actions are less than those provided for under alternatives B and D, resulting in a greater adverse impact.

Under Alternative A, cultural resource inventories and site evaluations are in direct response to specific land use proposals in accordance with NEPA and Section 106 of the NHPA. Additional inventory is carried out when resources permit to comply with Section 110 of the NHPA. While these actions benefit cultural resources, they are the minimum required by law.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected surface disturbance from BLM actions is the lowest of any alternative (refer to Table 4-1). As in Alternative A, the net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance. The impacts to cultural resources from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative B is anticipated to be less than Alternative A and the least relative to all other alternatives.

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for cultural resources. For example, under Alternative B, an NSO restriction for fluid minerals is in place for highly erosive soils or slopes greater than 25 percent and a number of special designations protect areas from surface disturbance, as identified in Table 2-3. No wind-energy development projects are allowed within 5 miles of significant cultural areas, in contrast to Alternative A that does not restrict such development, or Alternative C, which allows wind-energy development with some restrictions. These types of management actions result in beneficial impacts to cultural resources.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface land under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, no BLM-administered surface area is identified for disposal. This is the only alternative with no acreage slated for disposal, resulting in indirect beneficial impacts to cultural resources.

Access. The indirect adverse impacts of access from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development of any alternative (as represented by surface disturbance numbers in Table 4-1). These management actions result in indirect adverse impacts to cultural resources, but less adverse impacts than under Alternative A.

Alternative B precludes granting an ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Alternatives A and C do not prohibit ROW through these sites. Alternative B results in an indirect beneficial impact to cultural resources.

Proactive Management Actions. Proactive cultural resource management actions for the Bridger Antelope Trap include closing the area to OHV use, excluding prescribed fires and vegetation treatments in the 640-acre section that includes the site, withdrawing this section from the operation of the mining laws, and preserving the viewshed within 10 miles. Alternative B prohibits establishment of ROW corridors and wind-energy projects, as well as all surface-disturbing activities, closes the area to OHV use, and excludes prescribed fires and vegetation treatments on BLM-administered lands within the defined boundaries of the following sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). This alternative adds four sites to this management category that are not included in alternatives A or C, but are included in Alternative D, thereby beneficially impacting cultural resources.

Under Alternative B, cultural resource inventories are conducted according to a system based on high, medium, and low probability zones for cultural resources. This management action results in a beneficial impact to cultural resources. Using the Class I overview to identify high probability areas, Class III surveys are then conducted in priority areas. This plan results in survey and identification in more areas than alternatives A or C, and a similar coverage as found in Alternative D.

Cultural resource management plans developed for a number of sites will govern actions that could impact those sites: Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp; and Rocky Gap trail landmark. This is the only alternative that explicitly states that a management plan will be developed benefiting these areas. Alternative D holds out the possibility that such plans could be developed. Alternatives A and C determine whether to develop plans on a case-by-case basis. In addition, Alternative B will preserve the viewshed of these sites, as well as the Bear River Divide trail landmark and the Gateway petroglyphs within a 10-mile buffer. The objective is to ensure that the visual characteristics of the setting that contribute to the eligibility of the site, are managed to retain the existing character of the landscape in federal sections so developments do not dominate the visible area or detract from the feeling or sense of the historic time period of the site. These proactive cultural resource management actions result in additional protection and beneficial impacts to cultural resources.

The viewshed of Class 1 trail segments, identified NRHP-listed sites (Table 2-3), and the Bridger Antelope Trap juniper fence will be protected by a 10-mile buffer under Alternative B. In contrast, alternatives C and A manage these resources according to VRM maps from 1986, while Alternative D applies VRM classes and associated management to specific areas. Overall, Alternative B results in greater beneficial impacts to cultural resources than all other alternatives.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected surface disturbance from BLM actions is the second highest of all alternatives (refer to Table 4-1). The impacts to cultural resources from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Fewer restrictions on surface-disturbing activities for protecting other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C; therefore, additional protection for cultural resources under Alternative C is less than all other alternatives except Alternative A. For example, under Alternative C, surface disturbance on highly erosive soils and slopes greater than 25 percent is allowed. Alternative C does not allow for wind-energy development within the boundaries of the Bridger Antelope Trap. These types of management actions can result in beneficial or nonadverse impacts to cultural resources when management actions call for documentation or impact mitigation; however, they are less beneficial than under any other alternative.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative C are the same as those identified under Alternative A. Under Alternative C, more acres of BLM-administered surface are identified for disposal by sale than under alternatives B and D. The impacts of land-tenure adjustment will be similar to those described in Alternative A.

Access. The indirect adverse impacts of access from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the second highest level of development of all alternatives. These actions result in indirect adverse impacts to cultural resources. The adverse impacts under Alternative C are less than those identified under Alternative A, but greater than all other alternatives.

Similar to Alternative A, Alternative C does not preclude granting a ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). The management actions could adversely affect cultural resources. Alternatives B and D restrict ROW placement through these sites.

Proactive Management Actions. Proactive cultural resource management actions for the Bridger Antelope Trap, comprising an NSO restriction for fluid minerals on 480 acres, are the same as those identified under Alternative A. Similarly, protection for the specific sites at Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, and the Alfred Corum emigrant gravesite are the same as those identified under Alternative A. No additional protective measures are identified under Alternative C for other sites specifically mentioned in alternatives B and D.

Under Alternative C, cultural resources management plans will be developed for sites eligible for or listed on the NRHP, on a case-by-case basis. This management action results in a beneficial impact to cultural resources. Class II or Class III inventories conducted in areas where expected development and (or) management decisions are likely to impact cultural sites is balanced by the exclusion of cultural resources surveys in low-site density areas for future projects. This results in a more proactive approach to inventory than Alternative A, but by completely eliminating surveys in areas with low probability for cultural resources, some resources may still be adversely impacted. However, all significant historical, archeological, and cultural sites are protected or mitigated.

The viewshed of cultural resources and NHTs are managed according to VRM maps from 1986. All historical, archeological, and cultural sites eligible for or listed on the NRHP are protected or mitigated; the objective will be to protect the trails from visual intrusion and surface disturbance to maintain integrity of setting.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, the projected short-term surface disturbance acreage from BLM actions results in the second lowest disturbance acreage following Alternative B (refer to Table 4-1). The impacts to cultural resources from surface-disturbing activities under Alternative D are anticipated to be adverse, as is the case for all alternatives and commensurate with the RFAs as shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative D is anticipated to be less than under Alternative A. The net potential disturbance to historic properties is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative D provide additional protection for cultural resources. Under this alternative, surface disturbance on highly erosive soils is minimized to the extent practicable; an NSO restriction for fluid minerals is implemented and OHV use is allowed only on the currently established road for the Bridger Antelope Trap. These types of management actions result in beneficial impacts to cultural resources. Alternative D also provides restrictions on the development of wind energy that exclude the federal section that contains the Bridger Antelope Trap and the federal sections within 3 miles of the Bridger Antelope Trap.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, acres of BLM-administered surface identified for disposal by sale are third highest, after alternatives A and C. Only Alternative B disposes of less surface (i.e., none) than Alternative D. Disposal of BLM-administered surface results in both a beneficial and adverse impact to cultural resources, as described in Alternative A.

Access. The indirect adverse impacts of access from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1). These actions result in an indirect adverse impact to cultural resources, and the impacts under Alternative D are less in intensity than those identified under Alternative A.

Alternative D precludes granting an ROW through these archeological sites: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark

(15 acres), and Bear River Divide trail landmark (3 acres). Alternatives A and C do not prohibit ROW through these sites. Alternative D results in more beneficial indirect impacts than Alternative A.

Proactive Management Actions. Proactive cultural resource management actions for the Bridger Antelope Trap include restricting surface-disturbing activities in the federal section (640 acres) that contains the Bridger Antelope Trap, an NSO restriction for fluid minerals in the section, and OHV use allowed only on the currently established road. Prescribed vegetation treatments could occur to protect the physical characteristics of the site. This provides more protection to the site than alternatives A and C, but less than Alternative B, where all surface-disturbing activities are prohibited and the area is closed to OHV use.

For Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres), specific sites-management actions include managing surface-disturbing activities on BLM-administered lands within the defined boundaries of the sites by implementing an NSO restriction for fluid minerals on newly issued leases, OHV use only on current established roads, and making the areas ROW exclusion zones. In addition, management prescriptions using vegetation treatments to protect or enhance the sites are allowed. In addition, Alternative D will preserve the viewshed of these sites as well as the Bear River Divide trail landmark and the Gateway petroglyphs within a 3-mile buffer. The objective is to ensure that the visual characteristics of the setting that contribute to the eligibility of the site are managed to retain the existing character of the landscape in federal sections so developments do not dominate the visible area or detract from the feeling or sense of the historic time period of the site. ROW will be designed to preserve the visual integrity of the sites consistent with the BLM visual resources handbook and manual. This management action is intended to manage developments to maintain setting qualities and not to have an exclusion zone. These management actions result in an indirect beneficial impact to cultural resources.

Alternative D has the possibility of developing cultural resource management plans for sites eligible for or listed on the NHRP, specifically the Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, and Rocky Gap trail landmark. The Class I overview will be used to identify zones of high, medium, and low probability for cultural sites and to identify where current and future land uses threaten cultural sites. This methodology is based on NHPA Section 110, proactive inventories. Additional consultation with SHPO would help develop a model for this type of inventory. Class III inventories are to be conducted in zones where the greatest threats to cultural resources exist. This management action results in a beneficial impact to cultural resources. It is a more pro-active plan than alternatives A and C, and is similar to Alternative B.

VRM Class II areas are specifically defined for management of sensitive cultural resources, including the northwest portion of the planning area north and east of U.S. Highway 30. In addition, the federal section that contains the Bridger Antelope Trap and the federal sections within 3 miles of the Bridger Antelope Trap are considered VRM Class II in consideration of sensitive cultural resources and the views from those resources.

National Historic Trails

Alternative A

Surface-disturbing Activities. Under Alternative A, the impacts to NHTs from surface-disturbing activities are anticipated to be commensurate with the intensity of RFAs shown in Appendix M. Under Alternative A, the projected short-term surface disturbance from BLM actions is the highest of all alternatives (refer to Table 4-1). Moreover, the impacts to NHTs from surface disturbance projected for

Alternative A are anticipated to be primarily adverse. The potential adverse impact to trails is somewhat limited, however, because compliance with Section 106 of the NHPA requires that some type of mitigation be applied to trail segments contributing to the overall importance prior to any disturbance. The relative amount of surface disturbance projected for each alternative defines the level of potential impact to NHTs.

In those cases in which an accommodation cannot be made to preserve the trail, consultation between the BLM and the SHPO and affected interests takes place to develop and implement a treatment plan to mitigate adverse impacts to contributing segments. While this often results in project relocation, detailed recording and mapping or interpretation are some of the techniques that have been used for mitigation, depending on the specific trail segment and the nature of the potential adverse impacts.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for trail resources. For example, under Alternative A for soils, surface-disturbing activities may be modified, timing restrictions implemented, or surface disturbance in selected areas prohibited. However, fewer restrictions on surface-disturbing activities are provided for under Alternative A as compared to alternatives B and D; therefore, additional protection for NHTs under Alternative A is less than all other alternatives.

Land Disposal and Acquisition. Disposal of BLM-administered surface land can result in both beneficial and adverse impact to NHTs. Under Alternative A, 59,181 acres are identified for disposal. The results of the survey required under Section 106 of the NHPA produce a beneficial impact to cultural resources because they generate data that further understanding of trail resources in the planning area. If contributing segments were identified during the inventory, it could result in an adverse impact because once in private ownership, there are no protective measures for cultural resources. However, land-tenure adjustment is classed as an adverse impact (in terms of Section 106) for that reason. Impact mitigation for trail segments contributing to the overall NRHP eligibility might include application of a treatment plan developed through consultation between the BLM and the SHPO. Acquiring lands within the planning area could result in a beneficial impact to cultural resources in that additional sites may be obtained in the newly acquired lands.

Access. General development (e.g., recreational facilities and mineral development) and OHV use can provide access to remote trail segments, possibly leading to adverse impacts related to traffic, vandalism, and erosion. For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, it is anticipated that the highest amount of development and increase in access occurs under Alternative A and results in indirect adverse impacts. Since adverse impacts to important trail segments must be mitigated prior to authorizing an action, the degree of adverse impact is lessened.

Increased visitor use through OHV use and improved access can have both beneficial and adverse impacts on trail resources. For example, trail segments are protected when there are access restrictions, but may be exposed to vandalism or other impacts if multiple uses increase, including exploring for extractive resources (e.g., mining) or an increase in recreational opportunities. However, lack of access also can adversely impact the use of NHTs for activities, such as heritage tourism.

OHV use on public lands, under all alternatives, indirectly impacts NHTs. The impacts of OHV use are primarily anticipated to be adverse, indirect, and to occur in the areas limited to existing roads and trails for OHV use. Although OHV use currently is restricted in some areas, and use is limited to existing roads and trails, new trails are continuously created and become part of the "existing" designation.

Under Alternative A, ROW corridors are not designated and land use authorization is granted on a case-by-case basis. This is in contrast to alternatives B, C, and D, which specify treatment in relation to NRHP sites and NHTs (alternatives B and D) or on historic utility corridors (Alternative C).

Proactive Management Actions. Proactive management actions under Alternative A generally result in beneficial impacts to NHTs. Under existing management, the BLM's objective is to protect the trails from visual intrusion and surface disturbance and to maintain the integrity of setting. Generally, visual intrusion and surface disturbance are restricted or prohibited within ¼ mile of a historic trail or within the visual horizon of the trail, whichever is closer. Topography and existing surface disturbance are factors in determining the corridor characteristics. Since trails often comprise multiple traces, the ¼-mile zone extends from the outer edges of the overall trace.

Of the four NRHP-listed sites associated with NHTs, Emigrant Springs and Johnston Scout Rock are located on BLM-administered land. Eight sites have interpretive signs as NHTs. Management of NHTs emphasizes preservation coupled with increased visitor use and appreciation of the trail system. These management actions result in a beneficial impact.

Alternative B

Surface-disturbing Activities. Under Alternative B, the projected disturbance acreage from BLM actions is the lowest of any alternative (refer to Table 4-1). The impacts to NHTs from surface-disturbing activities under Alternative B are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M when they coincide with trails. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative B is anticipated to be less than Alternative A and the least relative to all other alternatives.

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for NHTs. Using soils, for example, under Alternative B, restrictions on surface-disturbing activities in areas of highly erodible soils are implemented and long-term surface disturbance is limited. These types of management actions result in beneficial impacts to NHTs.

ROW corridors may not be designated where they conflict with NHT management objectives. Wind-energy development projects are prohibited in areas that contain high resource values, including a number of trail-related archeological sites and Class 1 trail segments. These management actions result in a beneficial impact to NHTs.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface land under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative B, no BLM-administered surface is identified for disposal by sale, compared with Alternative A, where acreage is slated for disposal. Maintaining BLM jurisdiction over NHTs is beneficial, since the BLM must comply with federal laws, such as the NHPA, that require impact mitigation in response to adverse effects. Similarly, acquiring lands within the planning area results in a beneficial impact to NHTs due to the protective measures offered under federal ownership.

Access. The indirect adverse impacts of access from development and OHV use under Alternative B are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative B proposes the least amount of development by alternative (as represented by surface disturbance numbers in Table 4-1). These actions result in an indirect adverse impact to NHTs, but a less adverse impact than under Alternative A.

Proactive Management Actions. The guiding principal of NHT management under Alternative B is to develop and enhance Class 1 segments and sites by installing directional signs to trail segments from main roads, trail markers at trail traces, and interpretative signs. In addition, Alternative B calls for acquiring legal access for public visitation to trail segments and developing a stewardship program to lead trail tours, monitor sites, and generally assist with management, benefiting NHTs.

Under Alternative B, trail segments are ranked according to class levels, with restrictions based on their rankings. This alternative protects the physical evidence of NHTs (ruts/traces, graves, campsites, landmarks) by prohibiting all surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the following distances: (1) Class 1 segments (1 mile on each side of trail segments and within a 1-mile radius of gravesites and landmarks); (2) Class 2 segments (½ mile on each side of trail segments and within a ½-mile radius of gravesites and landmarks); and (3) Class 3 segments (¼ mile on each side of trail segments). These distance restrictions are greater than for any other alternative and, therefore, benefit NHTs more than the other alternatives.

The following trail-related sites are exclusion areas for ROW placements within their boundaries: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). This management action results in a beneficial impact to NHTs.

Alternative B provides for identifying the Oregon-California National Historic Trail Special Recreation Management Area (SRMA), to be created and managed to protect the historic value of the trails, while providing for interpretive opportunities benefiting NHTs. NHT heritage tourism will be the focus of the Dempsey Ridge SRMA in addition to preserving traces and settings of NHTs and associated sites. For NHTs and site settings, all surface-disturbing activities will be managed to retain the existing character of the landscape in federal sections so developments do not dominate settings to detract from the feeling or sense of the historic period of use. Alternative A identifies no SRMAs. Emigrant Spring/Dempsey and the Alfred Corum and Nancy Hill emigrant gravesites have NSO restrictions for fluid minerals; salt licks are not allowed. These management actions result in beneficial impacts compared to Alternative A.

Under Alternative B, VRM Class II areas are established within a 3-mile buffer of NHTs. Alternative B provides the greatest area of protection to NHT viewsheds, which are to be managed as follows. First, preserve the viewshed within 10 miles of Class 1 segments, where the visual characteristics of the setting contribute to the eligibility of the site, by managing to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic period of the trail setting. ROW will be designed to preserve the visual integrity of the settings consistent with the BLM visual resources handbook/manual. Second, preserve the viewshed within 5 miles of Class 2 segments by managing to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer. Third, preserve the viewshed within ½ mile of Class 3 segments by managing to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer. These management actions result in beneficial impacts compared to Alternative A.

Alternative C

Surface-disturbing Activities. Under Alternative C, the projected short-term disturbance acreage from BLM actions results in the second highest disturbance acreage of all the alternatives (refer to Table 4-1). The impacts to trail resources from surface-disturbing activities under Alternative C are anticipated to be adverse, similar in type to Alternative A, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-

disturbing activities under Alternative C is anticipated to be less than under Alternative A. No surface-disturbing activity is permitted without prior compliance with Section 106 of the NHPA.

More restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C than under Alternative A; therefore, additional protection for cultural resources occur under Alternative C compared to Alternative A. These types of management actions can result in beneficial or nonadverse impacts to cultural resources; however, to a lesser extent than under any other alternative.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative C, the same number of acres of BLM-administered surface land is identified for disposal by sale as Alternative A, which could have the greatest adverse impact to NHTs of all alternatives. Disposal of BLM-administered surface results in adverse impacts to NHTs as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs due to the protective measures offered under federal ownership. As noted above, the high value of NHTs prevents their inclusion in land-tenure adjustments.

ROW corridors are not restricted, and could be designated where they conflict with NHT management objectives. Wind-energy development projects may be placed throughout the planning area. These management actions may result in adverse impacts to NHTs.

Access. The indirect adverse impacts of access from development and OHV use under Alternative C are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the second highest level of development of all the alternatives. These actions result in an indirect adverse impact to NHTs. The adverse impacts under Alternative C are less than those identified in Alternative A.

Proactive Management Actions. Under Alternative C, management of NHTs is the same as for Alternative A, including maintaining existing interpretive sites; therefore, impacts are similar. Under Alternative C, management actions protect the physical evidence of NHTs (ruts/traces, graves, campsites, landmarks) by prohibiting or restricting surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the distances specified below. The definition and management of the corridor may depend on topography and existing surface disturbance as follows: (1) Class 1 segments—¼ mile on each side of trail segments and within a ¼ mile radius of gravesites and landmarks. (2) Class 2 segments—500 feet on each side of trail segments and within a 500-foot radius of gravesites and landmarks. (3) Class 3 segments—100 feet on each side of trail segments. Crossings at right angles to trails could be permitted on a case-by-case basis. These management actions result in an overall beneficial impact to NHTs.

Alternative C manages the viewsheds of NHT segments with project-specific analysis to determine level of restrictions within distances prescribed, resulting in beneficial impacts. First, manage the viewshed to retain the existing character of the landscape in federal sections so developments do not dominate the visible area to detract from the feeling or sense of the historic period of the trail setting within 1 mile or the visual horizon of Class 1 segments where the visual characteristics of the setting contribute to the eligibility of the site. Second, manage the viewshed to retain the existing character of the landscape in federal sections so developments do not attract the attention of the casual observer within ¼ mile or the visual horizon of Class 2 segments. Third, for Class 3 segments, manage the viewshed in accordance with the designated VRM class.

Alternative D (Proposed RMP)

Surface-disturbing Activities. Under Alternative D, the projected disturbance acreage from BLM actions results in the third highest disturbance acreage (refer to Table 4-1). The impacts to trail resources from surface-disturbing activities under Alternative D are anticipated to be adverse, as is the case for all alternatives, and commensurate with the locations and intensity of RFAs shown in Appendix M. However, the intensity of adverse impacts to cultural resources from surface-disturbing activities under Alternative D is anticipated to be less than under Alternative A. The net potential disturbance to NHTs is lessened by the requirement to conduct inventories and properly deal with such properties prior to any disturbance.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative D provide additional protection for cultural resources. For example, actions selected to minimize adverse effects to soils include relocating disturbance in areas of erodible soils and limiting total long-term disturbance. These types of management actions result in beneficial impacts to NHTs.

Land Disposal and Acquisition. The types of impacts from disposal of BLM-administered surface under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Under Alternative D, fewer acres of BLM-administered surface are identified for disposal than for alternatives A and C. Disposal of BLM-administered surface results in adverse impacts to NHTs as described in Alternative A. Likewise, acquiring lands within the planning area results in a beneficial impact to NHTs due to the protective measures offered under federal ownership.

ROW corridors will not be designated where they conflict with NHT management objectives. Wind-energy development projects are restricted to certain corridors, and prohibited in federal sections containing Class 1 trail segments, including trail-related archeological sites and Class 1 trail segments. These management actions result in beneficial impacts to NHTs.

Access. The indirect adverse impacts of access from development and OHV use under Alternative D are the same as those identified under Alternative A; however, the intensity varies by alternative. Alternative D proposes a decrease in development compared to Alternative A (as represented by surface-disturbance numbers in Table 4-1). These actions result in an indirect adverse impact to NHTs; however, the impacts under Alternative D are less in intensity to those identified in Alternative A.

Proactive Management Actions. Management of NHTs protects the physical evidence of NHTs designated under the National Trails System Act (ruts/traces, graves, campsites, landmarks) that exist on lands within federal jurisdiction by prohibiting all surface-disturbing activities that do not benefit the preservation and (or) interpretation of trails within the following distances: (1) Class 1 segments—¼-mile on each side of trail segments and within a ¼-mile radius of gravesites and landmarks. (2) Class 2 segments—500 feet on each side of trail segments and within a 500-foot radius of gravesites and landmarks. (3) Class 3 segments—100 feet on each side of trail segments and within a 100-foot radius of gravesites and landmarks. Crossings at right angles to trails could be permitted on a case-by-case basis. This could require boring beneath the trail trace. These management actions result in beneficial impacts to NHTs.

The following trail-related sites are exclusion areas to ROW placements within their boundaries: Emigrant Spring/Slate Creek (87 acres), Emigrant Spring/Dempsey (11 acres), Johnston Scout Rock (2 acres), Alfred Corum and Nancy Hill emigrant gravesites (½ acre each), Pine Grove emigrant camp (14 acres), Rocky Gap trail landmark (15 acres), and Bear River Divide trail landmark (3 acres). Emigrant Spring/Dempsey and the Alfred Corum and Nancy Hill emigrant gravesites have NSO restrictions for

fluid minerals. See the VRM Section for more detail. These management actions result in beneficial impacts to NHTs.

VRM of NHTs for Alternative D includes a number of visual corridors resulting in beneficial impacts: (1) a visual corridor extending up to 1 mile either side of the Sublette Cutoff and the Slate Creek Cutoff north of U.S. Highway 189 and east of Slate Creek Ridge in consideration of NHT views; (2) a visual corridor in the northwest portion of the planning area north and east of U.S. Highway 30 (excluding the Raymond Mountain WSA and the industrialized area west of the town of Kemmerer), defined in consideration of sensitive NHT segments; (3) a visual corridor extending up to 1 mile either side of the Oregon-California Trail in blocked federal lands south of U.S. Highway 30 and west of U.S. Highway 189 (Bear River Divide area), defined in consideration of sensitive NHT resources and views from NHTs; and (4) a visual corridor on federally administered lands extending up to 1 mile either side of the Oregon-Mormon-California Trail south of Interstate Highway 80 (I-80) and east of Bigelow Bench in Uinta County, defined in consideration of sensitive NHT and cultural resources views. The specific management provisions for NHT viewsheds is a decision under the VRM.

Alternative D provides for a wide range of protection to NHT viewsheds. These management actions are intended to manage developments to maintain setting qualities and not to have an exclusion zone. These proactive management actions result in more beneficial impacts compared to Alternative A.

Alternative D provides for identifying the Oregon-California National Historic Trail SRMA to be created and managed to protect the historic value of the trails, while providing for interpretive opportunities. The Dempsey Ridge SRMA would include monitoring of historic sites as a priority. Alternatives A and C identify no SRMAs. Alternative D is anticipated to have greater beneficial impacts to NHTs than Alternative A.

4.5.1.3 Conclusion

Archeology and Historic Resources

Allowable uses and management actions described in this section for the various alternatives are used to determine the potential impacts to cultural resources. Meaningful differences in surface-disturbing activities, land-tenure adjustments, access, and proactive management actions form the basis for the following conclusion. Impacts to cultural resources from the alternatives are anticipated to be similar in type, but different in intensity, whereas proactive cultural resource management actions result in beneficial impacts across all alternatives overall. Potential adverse impacts to cultural resources under Alternative B are anticipated to be the least adverse of all alternatives. Under all alternatives, the BLM continues its obligation to conduct government-to-government consultation with interested tribes. Actions required by the NHPA and the Wyoming State Protocol will form the foundation of all project-specific decisions regarding cultural resources. Conflicts between cultural resources and other resource uses not covered by the RMP will be resolved by the Wyoming State Protocol and provisions in the NHPA. The greatest adverse impacts to cultural resources are anticipated under alternatives A and C.

National Historic Trails

Meaningful differences in land disposal and acquisition, access, and proactive management actions form the basis for the following conclusion. Impacts to NHTs from the alternatives are anticipated to be similar in type, but different in intensity. Among the management alternatives, Alternative B provides a greater level of protection and preservation for NHTs resources, Alternative D provides somewhat fewer protections, and alternatives A and C provide the fewest protections. Alternative A permits beneficial surface disturbance on the NHTs, but does not provide additional viewshed protections. Alternative D provides protections where a historic setting contributes to the NRHP eligibility of a trail or rankings of

Class 1 through 3 trail segments. Class 1 NHT trail segments are included for Class II VRM. Development projects could cross NHTs at right angles in areas of existing disturbance, with specific effects evaluated on a case-by-case basis. Under Alternative D, mineral leasing continues, but surface-disturbing activities that do not benefit the preservation and (or) interpretation of the trails are limited based on class ranking level. Fences and other range improvements are permitted if they cause no new disturbance and if they can be agreeable with applicable VRM class.

4.5.2 Native American Concerns

Impacts to Native American traditional resources or sacred sites are identified in consultation with tribes. The BLM consults with the Eastern Shoshone, Northern Arapaho, Shoshone Bannock, and Northern Ute tribes to identify potential impacts to sites of cultural concern on BLM-administered lands.

4.5.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All tribal-sensitive sites in the planning area have not been identified.
- Identification of tribal sensitive sites will benefit heritage resources.
- Tribal consultation benefits heritage resources.

4.5.2.2 Analysis of Alternatives

Allowable uses and management actions that could impact Native American traditional resources include all surface-disturbing activities, access, and proactive management actions.

Impacts Common to All

For all alternatives, failure to identify potentially culturally sensitive sites and consult with the appropriate tribal entity could result in the loss of cultural sites that have traditional or sacred importance to Native Americans. Impacts may include surface disturbance, loss of access, increased access to non-traditional users, or changes in setting. In all cases, consultation may mitigate some or all of these impacts. In addition, under any alternative, the BLM will comply with the NHPA, including identification, consultation, evaluation, and impact mitigation of NRHP-eligible or culturally sensitive resources.

Alternative A

Alternative A emphasizes consultation on project-specific impacts. Under the current management practice, proposed actions are evaluated for their potential to impact culturally sensitive sites on a project-by-project basis. Once a project has been identified, consultation among the BLM, interested tribes, and the project proponents helps identify potential impacts and protection measures. Protection measures are not implemented until the project goes forward.

Surface-disturbing Activities. Current guidelines for identifying areas that are sensitive to surface-disturbing activities provide some protection for what could be sensitive sites. Slope restrictions to oil- and gas-related activities reduce impacts to archeological sites. As the BLM consults with Native Americans on extractive resource exploration projects throughout the planning area, the BLM may add stipulations or require impact mitigations, benefiting Native American traditional resources.

Access. Alternative A includes no access restrictions specifically instituted to address Native American concerns or other cultural resources. Should access to resources of Native American concern become problematic, the BLM will institute consultation.

Proactive Management Actions. Consultation occurs on a project-by-project basis, but is predicated on existing relationships among the tribes and BLM. Although the BLM does not consult with Native Americans until a project is identified, the ongoing nature of the consultation and compliance with the relevant federal laws and regulations (e.g., NHPA, American Indian Religious Freedom Act [AIRFA], Native American Graves Protection and Repatriation Act [NAGPRA]) will help address issues as they arrive. Consultation at the inception of projects also will ensure that all parties are well-informed and can work together, benefiting Native American concerns.

Alternative B

This alternative proposes ethnographic research and consultation between the BLM and Native Americans in advance of projects, with the goal of identifying specific topics and sites of concern. In addition to identifying specific resources, research and consultation will develop preservation and protection measures, resulting in greater beneficial impacts to Native American traditional resources than Alternative A.

Surface-disturbing Activities. Alternative B provides the greatest restrictions on development, which results in the greatest potential protection of sites of cultural concern to Native Americans. Withdrawal of lands from operation of the mining laws, such as the BLM-administered parts of the Bridger Antelope Trap, also ensures protection for these resources that could be of traditional importance.

Access. The result of access and development restrictions instituted under Alternative B could be contradictory. Access limitations preserve sensitive cultural resources from casual damage, looting, or development. Limitations that preserve viewsheds around NRHP-listed sites, such as the Triangulation Point Draw District and the Bridger Antelope Trap, also have the effect of preserving those aspects of these resources that could make them of concern to Native Americans. However, access limitations could also result in Native Americans losing access or facing limitation to the use of traditional resources or sites.

Proactive Management Actions. This alternative requires ethnographic research and consultation in advance of projects. The result should be that land managers will know the location and importance of sensitive cultural resources that are important to Native Americans prior to making land management decisions, including the review and issuance of permits. In addition, by managing plant and animal resources with conservation in mind, Alternative B conserves these resources that could be of traditional subsistence concern to Native Americans more than Alternative A.

Alternative C

Alternative C relies on knowing what site types and resources are of concern to Native Americans and are likely to be encountered in advance of projects. If an area is sensitive for specific resource types, then the BLM would conduct consultation on a project-by-project basis.

Surface-disturbing Activities. With the greatest amount of acreage open to oil, gas, and other leasable resources with standard or moderate stipulations, this alternative has the potential for encountering the greatest number of cultural resources of concern to Native Americans. The resulting extensive consultation would be followed by appropriate impact mitigations.

Access. Alternative C is similar to Alternative A in number of acres closed to OHV use and areas where OHV must stay on existing roads. However, it also opens additional acreage, which could provide access to culturally sensitive sites. Limits on access are less likely under this alternative.

Proactive Management Actions. As with Alternative A, consultation occurs on a project-by-project basis, but is predicated on existing relationships among the tribes and the BLM. An important difference is that consultation might not occur if research indicates that an area is unlikely to have site types of interest to Native Americans. Should this assumption be mistaken, trying to consult after a project has begun can complicate both the relationship and the project schedule. Although the BLM does not consult with Native Americans until the need is identified, the ongoing nature of the consultation and compliance with the relevant federal laws and regulations (e.g., NHPA, AIRFA, NAGPRA) will help address issues as they arrive.

Alternative D (Proposed RMP)

Under Alternative D, the BLM and concerned Native Americans consult both proactively and on a project-by-project basis. As the BLM identifies areas of low, medium, and high sensitivity for the presence of resources of Native American concern, project consultation occurs only on those projects with an anticipated effect. Eventually, the BLM and Native Americans from concerned tribes will develop programmatic agreements on management of these resource types. Such an agreement would include protection measures that the BLM would agree to implement. Until the specifics of the programmatic management are determined, the BLM plans to consult with Native Americans on a project-by-project basis depending on the project location, predicted site types, and possible protection measures.

Surface-disturbing Activities. Alternative D closes more acres to leasable resources than alternatives A and C, but only one-quarter as many as Alternative B. This increases the possibility of impacts to cultural resources of concern to Native Americans. However, it protects the viewsheds of almost as many acres as Alternative B.

Access. Trail usage by OHVs is similar to alternatives A, B, and C, resulting in little change to the accessibility of sensitive sites to casual looting or damage from overuse. Grazing could continue throughout the planning area, with review and possible exceptions made for sensitive resource areas. Access limitations are unlikely to affect Native American use of traditional or sensitive resources.

Proactive Management Actions. By planning to create and implement programmatic management developed through consultation, the BLM does two things. First, the basis for consultation is a partnership between the BLM and the interested tribes, which is in the spirit as well as the letter of the overarching legislation that requires consultation. Second, by being proactive in thinking through possible locations, site types, and situations, the BLM and the tribes confront the variety of situations that will require consideration in administering the RMP.

4.5.2.3 Conclusion

Under the existing conditions of Alternative A, project-by-project consultation can be time-consuming and may be difficult to integrate with a project schedule. Alternative B protects the greatest number of acres and, by extrapolation, the greatest number of sites that may be of concern to Native Americans. It calls for ethnographic research, which may identify site types, and consultation with tribes to develop preservation and protection measures. However, it still addresses protection and preservation of sites individually; given the large number of sites present throughout the planning area, cultural resources management under this alternative may not be able to keep up with identification. Alternative C allows surface disturbance over the second largest acreage, which will result in the second greatest need for consultation, identification, and implementation of preservation plans.

Finally, Alternative D approaches cultural resource management from a programmatic perspective, an approach that identifies Native American concerns and sensitive sites, allowing consultation to occur in advance of projects and provides a management plan likely to be based on maximum resource knowledge and likely to be implemented.

4.5.3 Tribal Treaty Rights and Trust Responsibilities

The Kemmerer Field Office coordinates and consults regularly with appropriate Native American groups to identify and consider their concerns in BLM land use planning and decisionmaking. Interested tribes review proposed land use planning decisions and other major BLM decisions for consistency with tribal land use and resource allocation plans; however, no treaty rights pertain directly to BLM-administered lands within the planning area.

Impacts to tribal treaty rights and trust responsibilities can include, but are not limited to, limitations on access to tribal hunting, fishing, or resource collection areas reserved by treaty, economic issues, and other resource use and access issues. Impacts are identified in consultation with the appropriate tribal groups.

4.5.3.1 Methods and Assumptions

The methods and assumptions used in this impact analysis include the following:

- No tribal treaty rights apply to BLM-administered lands in the planning area.

4.5.3.2 Analysis of Alternatives

Because no treaty rights apply directly to the planning area, the alternatives resemble each other in having no effect on tribal treaty rights. Differences in the treatment of cultural resources, level of consultation, and other issues of concern to Native Americans are discussed in the preceding section and throughout the Heritage Resources section.

4.5.3.3 Conclusion

No tribal treaty rights or trust responsibilities are known within or mandated by the Kemmerer Field Office. Management actions on the part of the BLM will have no impact on such rights. Each alternative has measures to protect cultural resources, including those related to traditional uses and practices. These are discussed and analyzed in the Heritage Resources section.

4.5.4 Paleontological Resources

Much of the lands managed by the BLM in the planning area have badlands topography or exposed bedrock, resulting in a higher potential for the discovery of fossil localities than on most private lands. Direct impacts to paleontological resources from RMP alternatives typically result from actions that physically alter, damage, or destroy fossils or their contexts. For example, any type of surface disturbance in an area containing fossil resources could have a direct impact by disturbing important paleontological values. These actions also may have an indirect impact by providing greater access to the area, which can bring increased vandalism, removal of materials, and inadvertent damage that could impact fossils or their contexts. Conversely, actions that result in data collection and preservation of paleontological resources can be considered beneficial impacts.

4.5.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Scientifically important fossils will continue to be found within the planning area.
- Adverse impacts to paleontological resources occur from physical damage or destruction of fossils, from loss of related scientific data, and from transfer of surface estate from public ownership.

- Adverse impacts to paleontological resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, it is valid to use the projected numbers for short-term surface disturbance to quantify impacts to paleontological resources. Erosion resulting from long-term surface disturbance or from naturally occurring climatic events can adversely impact paleontological resources, but not to the extent of short-term surface disturbance.
- In some cases, paleontological surveys are required prior to authorizing surface-disturbing activities. These surveys, and monitoring of construction, sometimes result in identification of information about the resource that would otherwise not be available, as well as result in the collection and curation of fossils for further research. In these cases, surface-disturbing activities, along with avoidance or full mitigation, can provide a benefit to the resource.
- In some cases, surface-disturbing activities, such as mining, can have the beneficial effect of exposing fossils that would have otherwise remained undiscovered.

4.5.4.2 Analysis of Alternatives

Allowable uses and management actions that could impact paleontological resources include all surface-disturbing activities, changes in ownership, visitor accessibility, OHV use, and proactive paleontological resource management actions.

Impacts Common to All Alternatives

The types of impacts projected to occur to paleontological resources because of the alternatives are similar; however, the intensity of impacts is anticipated to vary by alternative. Therefore, impacts to paleontological resources from surface-disturbing activities, changes in ownership, visitor accessibility, OHV use, and proactive paleontological resource management actions are described under the individual alternatives.

Alternative A

Surface-disturbing Activities. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact paleontological resources. Under Alternative A, the projected short-term surface disturbance from BLM actions results in the highest disturbance acreage of all alternatives (refer to Table 4-1).

The intensity of impacts to paleontological resources from surface-disturbing activities under Alternative A is anticipated to be similar to the RFAs shown in Appendix M. Moreover, the impacts to paleontological resources from surface disturbance projected for Alternative A are anticipated to be primarily adverse. However, it should be noted that mitigation of adverse impacts often results in data collection, recovery of significant fossils, and (or) preservation of paleontological resources, which could result in a small beneficial impact to the resource.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative A provide additional protection for paleontological resources. For example, under Alternative A, oil- and gas-related activities are restricted on slopes greater than 25 percent and an NSO restriction for fluid minerals applies to slopes greater than 40 percent. This and other management actions of this type result in beneficial impacts to paleontological resources because they limit the potential for disturbance.

Land Disposal and Acquisition. Since fossils are considered part of the surface estate, disposal of public surface containing known or previously undocumented paleontological resources results in an adverse impact to paleontological resources due to the loss of fossils and the lack of protective measures

for paleontological resources when under private ownership. Under Alternative A, the greatest acreage is identified for disposal. Compared to the remaining alternatives, Alternative A represents the same impact as Alternative C, and a greater impact than alternatives B and D. Conversely, any acquisition of lands within the planning area that contains paleontological resources results in a beneficial impact to paleontological resources due to the protective measures offered under federal ownership and the gain of public fossils.

Access. General development (e.g., recreational facilities and mineral development) and OHV use result in increased access to public lands and, therefore, adverse impacts to remote paleontological resources occur. For example, paleontological localities are protected when there are access restrictions, but may be exposed to vandalism and erosion with increased access.

For the purpose of this analysis, development activities are anticipated to be similar in intensity to the surface disturbance acres identified in Table 4-1. Based on this assumption, it is anticipated that the highest amount of development and increase in access will occur under Alternative A and result in an indirect adverse impact to paleontological resources.

OHV use on public lands, under all alternatives, has the potential to directly and indirectly impact paleontological resources. Impacts of OHV use are primarily anticipated to be adverse. Direct impacts occur when vehicles repeatedly run over exposed fossils on a trail and indirect impacts occur from accelerated erosion and degradation due to exposure. Alternative A identifies the largest area for OHV use limited to existing roads and trails (Table 2-1). Although use is limited to existing roads and trails, new trails are constantly being created and become part of the "existing" designation throughout the planning area. When new trails are created, direct impacts may occur to paleontological resources on the surface. For this reason, increased access to remote locations under this OHV designation is more likely to occur.

Proactive Management Actions. Under Alternative A, current management practices continue. Existing management would continue to provide for paleontological research, limited recreational collection of common invertebrate and plant fossils, free use of limited amounts of petrified wood, and protection of significant fossils, as determined through a graded classification of significance (see Paleontological Resources in Chapter 3), However, management actions under Alternative A are slightly less protective than under alternatives B and D.

Alternative B

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative B are anticipated to be adverse (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative B is anticipated to be less than under all other alternatives. Under Alternative B, the projected short-term disturbance acreage from BLM actions is the lowest of any alternative (refer to Table 4-1).

Relative to Alternative A and other alternatives, Alternative B incorporates the most restrictions on surface-disturbing activities. Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative B provide additional protection for paleontological resources. For example, under Alternative B surface-disturbing activities are prohibited on sensitive or highly erosive soils or on slopes greater than 10 percent unless an adequate soil mitigation proposal is provided. In addition, the current NSO restriction for fluid minerals on slopes greater than 40 percent will continue under Alternative B. This and other similar management actions result in beneficial impacts to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The types of impacts expected to occur from disposal of public surface under Alternative B are the same as those identified under Alternative A. In general, disposal of public surface results in an adverse impact to paleontological resources and acquisition results in a beneficial impact. Unlike alternatives A, C, and D, Alternative B does not identify any public surface for disposal. As such, there is only the potential for a beneficial impact through the acquisition of additional public surface.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative B are the same as those identified under the other alternatives. However, Alternative B proposes the least amount of development by alternative (as represented by surface-disturbance numbers in Table 4-1) and provides the second smallest area for OHV use limited to designated existing roads and trails. These actions result in direct and indirect adverse impacts to paleontological resources, but a less adverse impact than in alternatives A, C, and D.

Proactive Management Actions. Under Alternative B, no new interpretive facilities are constructed; additional stipulations on permits are considered on a case-by-case basis; the BLM proactively identifies and designates areas of high paleontological values and applies NSO restrictions for new fluid mineral leasing and other management conditions, as needed; and the BLM retains public surface with important paleontological values. These proactive management actions result in a beneficial impact to paleontological resources. The proactive management actions under Alternative B are more protective than those identified under Alternative A, and the most protective of all alternatives.

Although Alternative B is similar to the rest of the alternatives in that it will continue existing proactive management actions, it increases the intensity of such actions due to the establishment of the Bear River Divide MA. In addition, a paleontology management plan would be completed for the new MA that would further scientific studies and provide for public education opportunities in the area. Alternative B also would designate the Fossil Basin ACEC for the preservation and research of fossil resources. As such, Alternative B is more protective than alternatives A, C, and D.

Alternative C

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative C are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. Under Alternative C, the projected short-term disturbance acreage from BLM actions result in the second-highest disturbance acreage of all the alternatives (refer to Table 4-1).

Fewer restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C; therefore, additional protection for paleontological resources under Alternative C is less than all other alternatives. For example, under Alternative C, oil- and gas-related activities are restricted on slopes greater than 25 percent and an NSO restriction for fluid minerals applies to slopes greater than 40 percent. This management action results in an adverse impact to paleontological resources because it opens more BLM land to surface-disturbing activities. When compared to alternatives B and D, Alternative C is less protective of paleontological resources.

Land Disposal and Acquisition. The acreage of public surface identified for disposal under Alternative C is the same as is identified for disposal under Alternative A. As such, impacts to paleontological resources due to the disposal of public surface would be the same as the impacts expected under Alternative A, and greater than under alternatives B and D. As described in Alternative A, disposal of

public surface results in an adverse impact, and acquisition results in a beneficial impact, to paleontological resources.

Access. The types of impacts anticipated to occur from development and OHV use under Alternative C are the same as those identified under other alternatives. Alternative C proposes a decrease in development compared to Alternative A (as represented by surface disturbance numbers in Table 4-1) and the second highest level of development of all alternatives. Alternative C designates the second highest acreage to OHV use limited to existing roads and trails.

Proactive Management Actions. Under Alternative C, current management practices continue as identified for Alternative A. As such, existing management would continue to provide for paleontological research, limited recreational collection of common invertebrate and plant fossils, and protection of significant fossils, as determined through a graded classification of significance (see Paleontological Chapter 3). In addition, management actions under Alternative C are slightly less protective than under alternatives B and D.

Alternative D (Proposed RMP)

Surface-disturbing Activities. The impacts to paleontological resources from surface-disturbing activities under Alternative D are anticipated to be adverse and similar in type to all alternatives (as identified in Appendix M). Under Alternative D, the projected short-term disturbance acreage from BLM actions results in the second-lowest disturbance acreage following Alternative B (refer to Table 4-1). As a result, the intensity of adverse impacts to paleontological resources from surface-disturbing activities under Alternative D is anticipated to be less than under alternatives A and C and more than Alternative B.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) under Alternative D provide additional protection for paleontological resources. For example, under Alternative D, in addition to oil- and gas-related activities being restricted on slopes greater than 25 percent and an NSO restriction for fluid minerals in place on slopes greater than 40 percent, other surface-disturbing activities are limited on sensitive and fragile soils. As with other alternatives, these types of management actions result in beneficial impacts to paleontological resources because they limit disturbance to paleontological resources.

Land Disposal and Acquisition. The acreage of public surface identified for disposal under Alternative D is less than the acreages identified for disposal under alternatives A and C. As such, impacts to paleontological resources due to the disposal of public surface under Alternative D would be less than the impacts expected under alternatives A and C, but greater than the impacts expected under Alternative B. Similar to other alternatives, the acquisition of additional public surface results in a beneficial impact to paleontological resources.

Access. Alternative D proposes a decrease in development compared to Alternative A (as represented by surface-disturbance numbers in Table 4-1), and Alternative D designates the third-highest acreage (along with Alternative C) to OHV use limited to existing roads and trails.

Proactive Management Actions. Alternative D is similar to alternatives A and C. However, proactive paleontological resource management actions also would include the use of current and future inventory data to identify and, if necessary, designate specific site(s) for protection. As such, Alternative D is more protective than alternatives A and C, but less protective than Alternative B.

4.5.4.3 Conclusion

Meaningful differences in surface-disturbing activities, disposal and acquisition, access, and proactive management form the basis for the following conclusion. Impacts to paleontological resources from the alternatives are anticipated to be similar in type, but differ in intensity. Proactive paleontological resource management actions result in beneficial impacts across all alternatives. Potential impacts to paleontological resources under Alternative A are anticipated to be the most adverse, whereas potential impacts from Alternative B are anticipated to be the least adverse. Potential adverse impacts to paleontological resources from Alternative C are anticipated to be similar in intensity and slightly less than Alternative A. Adverse impacts from Alternative D are anticipated to be greater than Alternative B, but less than alternatives A and C.

4.6 Land Resources

4.6.1 Lands and Realty

The following discussion highlights the primary differences between alternatives and their anticipated impacts on the lands and realty program. Included in the lands and realty program are land-tenure adjustments (e.g., sales, exchanges, acquisitions), land use authorizations (e.g., leases and permits), and withdrawals. Changes to the lands managed by the Kemmerer Field Office as a result of lands and realty activities could occur as follows: (1) land use authorizations could involve approvals to use BLM-administered land for various purposes; (2) land ownership adjustments could change ownership of land and, thus, authority over land management decisions involving local governments and the private sector; and (3) withdrawals could be set aside, withheld, or public lands could be used for public purposes that would prevent certain land use changes and development. This section focuses on how other resources potentially impact the lands and realty program by limiting or preventing realty actions. Refer to Maps 32 through 36 for lands and realty.

The purpose of the lands and realty program is to facilitate management of the lands and resources of the Kemmerer Field Office. The program adapts according to changing land management and resource needs and issues. As such, lands and realty program actions generally result in beneficial impacts within the planning area with regard to multiple use objectives. However, the majority of the workload currently accomplished in the lands and realty program is directly related to the high priority given to energy development. For that reason, land-tenure adjustments, including sales and exchanges, as well as recreation and public purpose (R&PP) leases and other types of authorizations, are difficult to complete. In addition, the presence of other resources could prevent lands and realty actions from being carried out; therefore, they also are considered an adverse impact on the lands and realty program.

The only types of direct impacts to the lands and realty program are resources that prevent or make it considerably more difficult to complete a transaction. For example, mitigating resource values required for a land-disposal transaction substantially increase processing costs and timeframes required to complete the transaction and temporarily delay the transaction; this is a long-term impact. Generally, no indirect impacts to the lands and realty program exist.

4.6.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The demand for land-tenure adjustments will increase, but the BLM's ability to respond to or to satisfy increased demands for land sales and exchanges will be limited by budget and by personnel constraints into the foreseeable future.
- Land acquisition is conducted by the lands and realty program as a support function to carry out the goals and objectives of other resources programs (e.g., cultural resources, fish and wildlife, recreation).
- Land-tenure adjustments (e.g., retention, disposal, acquisition) focus on disposing scattered parcels and acquiring lands to consolidate ownership, providing lands for community expansion, and improving management opportunities.
- In general, the lands and realty program is based on the requirements of resources and adjusts to accommodate them; however, when resources prevent or make it considerably more difficult to complete a transaction under the lands and realty program (e.g., when mitigation is required for a land-disposal transaction), these restrictions are considered adverse impacts to the lands and realty program.

- The number of land use authorizations will increase over the life of the plan.
- Existing withdrawals to other federal agencies will continue.
- The resource management actions having the most potential to affect lands and realty include cultural resources, fish and wildlife, special status species (wildlife, fish, and plants), riparian vegetation and wetland communities, water resources, recreation, VRM, and special designations.

4.6.1.2 Analysis of Alternatives

Allowable uses and management actions that could adversely impact lands and realty primarily include restrictions prohibiting or delaying lands and realty transactions.

Impacts Common to All Alternatives

The lands and realty program alternatives will result in a broad range of actions that could cause some changes to existing land uses (e.g., new development) over time, both directly and indirectly. The following discussions summarize the primary differences between the alternatives with respect to general land use changes potentially associated with each of these factors.

Land ownership adjustments consolidate the relatively fragmented public land ownership pattern within the planning area to allow better management of public lands over the long term. Consolidating public land holdings facilitates access to public lands and reduces the number of access easements needed, as well as leads to a reduction in encroachment problems from adjacent property owners. Lands identified for disposal under Sections 203 and 206 of the Federal Land Policy and Management Act (FLPMA) and identified as such in this plan are classified for disposal under Section 7 of the Taylor Grazing Act of 1934, as amended (43 USC 315f). These impacts are considered beneficial impacts.

Land use authorizations within the planning area comprise the issuance of leases and permits under Section 1732(b) of the FLPMA for various activities, such as habitation, cultivation, and trade and manufacturing uses; airport leases; and leases and conveyances under the R&PP Act. Demand for leases and permits and for airport leases in the past has been low; it is not anticipated that demand will increase substantially during the life of the RMP. Demand for R&PP leases and conveyances may continue as opportunities grow to enhance recreation or meet the land needs of communities and nonprofit groups; R&PP leases and patents are considered as the need arises under each of the alternatives. Other resources and resource uses may prevent or limit the issuance of land use authorizations if mitigation cannot be negotiated.

With regard to Desert Land Entries, these will be considered on a case-by-case basis under alternatives A, C, and D based on soil characteristics, irrigation requirements, salinity issues, and the practicability of farming the lands as an economically feasible operating unit. Under Alternative B, no BLM-administered lands within the planning area are available for Desert Land Entry due to these factors, plus lack of water supplies, legal water rights, rugged topography, or the presence of sensitive resources. However, Desert Land Entries are unlikely under any of the alternatives, as several of these factors (e.g., unsuitable soils, lack of water supplies, etc.) prevent these from occurring. As such, no impacts due to Desert Land Entries are anticipated.

Temporary use permits (TUPs) are considered under all alternatives for areas to be used only for the duration of construction activities or for other short-term needs. These activities are not expected to result in any substantial changes to the lands and realty program, as the activities are temporary and must comply with applicable terms and conditions and any constraints.

Similar to land-tenure adjustments, several resources, resource uses, and special designations could impact land use authorizations (e.g., Desert Land Entries, TUPs, R&PP leases, and patents). Prior to each

proposal, an inventory or survey is required to determine the presence of those resources, resource uses, or special designations, including cultural resources, fish and wildlife, special status species (wildlife, fish, and plants), riparian vegetation and wetland communities, water resources, recreation, each of the special designations, and mineral resources. If any of these resources or special designations is present, then additional mitigation may be required or the proposal may be prohibited. Impact avoidance is accomplished through project redesign, project abandonment, or mitigation specific to that resource. These actions can increase processing costs and timeframes, generally resulting in direct, long-term impacts to the lands and realty program. Because of the limited demand for land use authorizations, it is anticipated that impacts to this aspect of the lands and realty program will be minimal.

With the exception of mineral resource uses, withdrawals generally will be beneficial to resources, resource uses, and special designations because they prohibit land disposal and exclude some form of mineral development. Withdrawals segregate public lands and (or) federal minerals from operation of some or all of the public land laws, the mining laws, and (or) the mineral leasing laws. Operations under the mining laws are not discretionary actions with the Secretary of the Interior. Segregation is the only way to prohibit operations under the mining law—this is the underlying reason for withdrawals, classifications, and other segregations. Mineral material disposal and mineral leasing are discretionary actions of the Secretary of the Interior. No existing or proposed withdrawal segregates from disposal of mineral materials; only in rare instances does a withdrawal segregate against mineral leasing. In most instances, mining is prohibited on withdrawn lands. Withdrawals are intended and designed to preserve certain resource (including mineral) values or land uses in lieu of other mineral development. However, key components of the lands and realty program such as establishing or terminating withdrawals, are driven by other resource goals and objectives.

Reviews will be conducted for existing withdrawals, and it will be determined whether the withdrawals are still necessary. Only lands that have not been substantially changed in character by improvements or otherwise will be considered for revocation. New withdrawals will be considered as needs arise. New requests will be processed for protection of resources prior to lifting existing withdrawals, when those withdrawals are in the same location. Areas that contain withdrawal conflicts will be handled on a case-by-case basis.

Alternative A

Under Alternative A, 1,364,824 acres of BLM surface area are retained, while 59,181 are identified for disposal (see Map 32). Restricted disposal parcels already are recognized as containing resources, resource uses, and special designations requiring appropriate mitigation into any disposal. Land disposal to private entities or local governments could result in some lands being available for future development; however, large-scale changes to land use are not expected to occur. BLM-administered lands transferred from federal ownership to local governments or private entities typically will be used for the same or similar purposes for which they are currently used due to the lack of any substantial development pressure. Urban expansion for housing, businesses, and some light industry are some of the most probable large-scale land use changes involving public land disposal actions, yet most communities in the planning area are surrounded by large acreages of private land with only small nearby areas of public land. Sufficient expected demand for orderly community growth does not exist to deplete the available private lands necessitating expansion into outlying public land. These land use changes will be coordinated with local governments in consideration of existing land use plans and policies (e.g., county comprehensive plans). Under Alternative A, existing withdrawals continue and no additional withdrawals will occur (Map 34). The current withdrawals are primarily from locatable mineral development, which protect oil shale, coal, and phosphate resources.

Legal access will be sought for areas of intense timber production and high-priority areas, including the Raymond Mountain WSA, Dempsey Basin, Commissary Ridge, and Bear River Divide, to successfully manage public land. Alternative A does not include establishments of new MAs; therefore, there are few adverse impacts to the Kemmerer Field Office's ability to execute land-tenure adjustments (disposal) and land use authorizations (leases, permits, etc.).

Alternative B

No lands are identified for disposal under Alternative B and all 1,424,005 acres of the BLM surface area are identified for retention. Prohibiting disposals may affect the accomplishment of the lands and realty program goals. As such, the potential for land use changes due to future development are much lower than compared to Alternative A.

Alternative B will include the continuation of all existing withdrawals, with additional areas withdrawn (see Map 35). Withdrawals are primarily from operation of the mining laws for the protection of developed campgrounds, the federal section that includes the Bridger Antelope Trap, areas with special status plant and wildlife species, and the Cokeville Meadows NWR (see the Locatable Minerals section).

Legal access for timber and high-priority areas will be the same as for Alternative A. Alternative B includes the highest number of new MA establishments among the alternatives, resulting in the highest level of potential impacts to executing land use authorizations (no land disposal is proposed under Alternative B).

Alternative C

Potential impacts associated with land disposal under Alternative C are the same as those described under Alternative A (59,181 acres have been identified for disposal and 1,364,824 for retention) except that additional parcels are considered for disposal on a case-by-case basis (Map 32).

Procedures to lift the existing locatable mineral withdrawals within the planning area would be initiated under Alternative C, and no new withdrawals are added.

Establishment of MAs under Alternative C is similar to that under Alternative A, although the Raymond Mountain area no longer includes a designated ACEC. As such, there are no impacts to land-tenure adjustments and land use authorizations due to MAs. Alternative C has the lowest level of potential impacts to executing land use authorizations.

Alternative D (Proposed RMP)

Under Alternative D, potential impacts associated with land disposal are similar to those described under Alternative A, although lower in magnitude (35,500 acres are identified for disposal and 1,388,505 are identified for retention) (see Map 33).

Alternative D continues existing withdrawals and adds the same areas as Alternative B, except Alternative D does not withdraw areas with special status wildlife species (see Map 36). These withdrawals are for the protection of developed campgrounds, the federal section that includes the Bridger Antelope Trap, areas with special status plant species, and a portion of the Cokeville Meadows NWR (see the Locatable Minerals section). Therefore, withdrawals under Alternative D are second highest after Alternative B. Alternative D includes establishment of new MAs, although much fewer than are established under Alternative B. This creates the potential for some impacts to land-tenure adjustments and land use authorizations.

4.6.1.3 Conclusion

The most substantial difference among the alternatives with regard to lands and realty is the amount of lands identified for disposal, which could result in future development of these lands. Alternatives A and C have the greatest potential for this, as they involve the highest amount of acreage for disposal, with Alternative B involving the least (no lands identified for disposal) and Alternative D located in between. However, it is not anticipated that any large-scale changes to these lands will occur, as development pressure near the planning area is low. Alternative B results in a large increase in lands withdrawn from locatable mineral development, followed by Alternative D with a reduced withdrawn amount. Alternative C removes all existing withdrawals and Alternative A results in no changes to existing withdrawals.

4.6.2 Renewable Energy

Actions occurring through implementing each alternative could affect renewable energy. Direct impacts to renewable energy include management actions permitting or prohibiting renewable energy development. Indirect beneficial impacts on renewable energy sources include management actions encouraging or facilitating renewable energy development. Indirect adverse impacts include management actions constraining renewable energy development.

In general, public utilities and private interests will develop renewable energy facilities based on market demand. Wind-energy development, the fastest growing sector of the renewable energy market, has had consistent growth of more than 20 percent over the last 10 years (researchandmarkets.com 2003). Wyoming public and private sector initiatives also have had increased renewable energy production (GAO 2004; Energy Atlas 2004). Solar and biomass energy development are not projected to impact available renewable energy resources in the planning area; therefore, wind energy is the primary focus of this analysis. Refer to maps 37 through 39 for renewable energy.

4.6.2.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Wind-energy development is expected to increase, relating directly to energy prices, national policy involving renewable energy, market demand, and other factors that encourage demand for alternative energy sources.
- Future wind-energy development proposals on BLM-administered lands within the planning area will be subject to the decisions and policy developed in the BLM's *Final Programmatic Environmental Impact Statement on Wind-Energy Development on BLM-Administered Lands in the Western United States* (BLM 2005b). This Programmatic EIS proposes a wind-energy development program that implements policies and BMPs for ensuring that the impacts of wind-energy development on BLM lands are kept to a minimum.
- Renewable energy projects are dependent upon the capacity to transmit the energy product, therefore there is a direct relationship between the ability to locate ROWs and renewable energy project placement.
- For analysis purposes, the national wind-energy capacity is projected to increase to 48,000 megawatts or more by 2025 (GAO 2004).
- The mapping of wind-energy potential areas is based on a large-scale nationwide mapping process likely to show a large margin of error if used for specific project location and prioritization of available renewable energy development sites.

4.6.2.2 Analysis of Alternatives

The types of impacts projected to occur to renewable energy because of the various alternatives are similar; however, the intensity of each impact is anticipated to vary by alternative. Therefore, management actions projected to impact renewable resources are described in general as impacts common to all alternatives and, more specifically, as impacts associated with individual alternatives.

Impacts Common to All Alternatives

Each alternative includes some restrictions to nonwind renewable energy projects. Managing for resources, such as soils, biological resources, cultural resources, visual resources, historic trails, and ROW and corridors, will most likely constrain renewable energy in the planning area. In general, management actions intended to protect these resource programs restrict wind-energy development by restricting the use of certain lands in the planning area for development and operation of wind-energy infrastructure. Indirect benefits for the local economy may occur from diversification of local energy sources.

Alternative A

Under Alternative A, the BLM makes no specific decision regarding areas suitable for renewable energy development. Instead, the BLM responds to specific proposals for renewable energy on a case-by-case basis. Market forces are the primary guides for renewable energy development opportunities.

Restrictions on surface disturbance to avoid or minimize soil erosion do not specifically restrict wind-energy development under Alternative A. Surface disturbance from wind-energy development under Alternative A estimates 134,400 acres in both the short term and in the long term (refer to Appendix M). Likewise, Alternative A does not specifically restrict wind-energy development to protect biological resources. For example, Alternative A does not address habitat fragmentation, prohibit high-profile structures, or protect areas containing high resource values in terms of restrictions of wind-energy development. Alternative A does provide protection for all historic, archeological, and cultural sites that are eligible for or listed on the NRHP; however, it does not prohibit establishment of ROWs and corridors and wind-energy projects. Moreover, Alternative A does not designate ROW and corridors in the planning area that could provide support for energy transmission. The VRM classification under Alternative A primarily protects the Raymond Mountain WSA, recreational sites, and river corridors. Visual protections for NHTs, Bridger Antelope Trap, and sites eligible for or registered on the NRHP are limited to the visual horizon or ¼ mile. Management of the Raymond Mountain WSA under Alternative A strictly limits wind-energy placement based on the Interim Management Policy. Lastly, the Rock Creek/Tunp and Bear River Divide areas do not specifically prohibit high-profile structures, such as wind-energy facilities, under this alternative.

Alternative B

Under Alternative B, restrictions to protect other resources limit the areas suitable for wind-energy development to 12 percent of the BLM-administered surface (176,109 acres). Surface disturbance is managed to limit soil erosion by consolidating road networks and equipment placement; prohibiting surface disturbance in areas of sensitive or fragile soils, highly erosive soils, chemical and biological crusts; and limiting surface disturbance in areas where slopes are greater than 10 percent. To protect biological resources, Alternative B minimizes construction disturbance to the smallest acreage possible; restricts habitat fragmentation to no more than 3 percent of available special status species' habitats; and prohibits new high-profile structures within 1 mile of occupied sagebrush obligate habitats. To protect cultural and visual resources, Alternative B prohibits the establishment of ROW and corridors and wind-energy projects within the boundaries of specific sites; designates and prohibits corridors to specific locations; prohibits wind-energy development in areas containing high resource values; establishes a 3-

mile visual buffer around sensitive roads, NHTs, campgrounds, towns, and sites registered on the NRHP; preserves a 10-mile viewshed around specific sites; and establishes viewshed buffers around significant NHT segments in the planning area. Identifying other management for the Rock Creek/Tunp and Bear River Divide areas under Alternative B prohibits wind-energy facilities in these areas. Impacts to renewable resources are greater under Alternative B than Alternative A and all other alternatives.

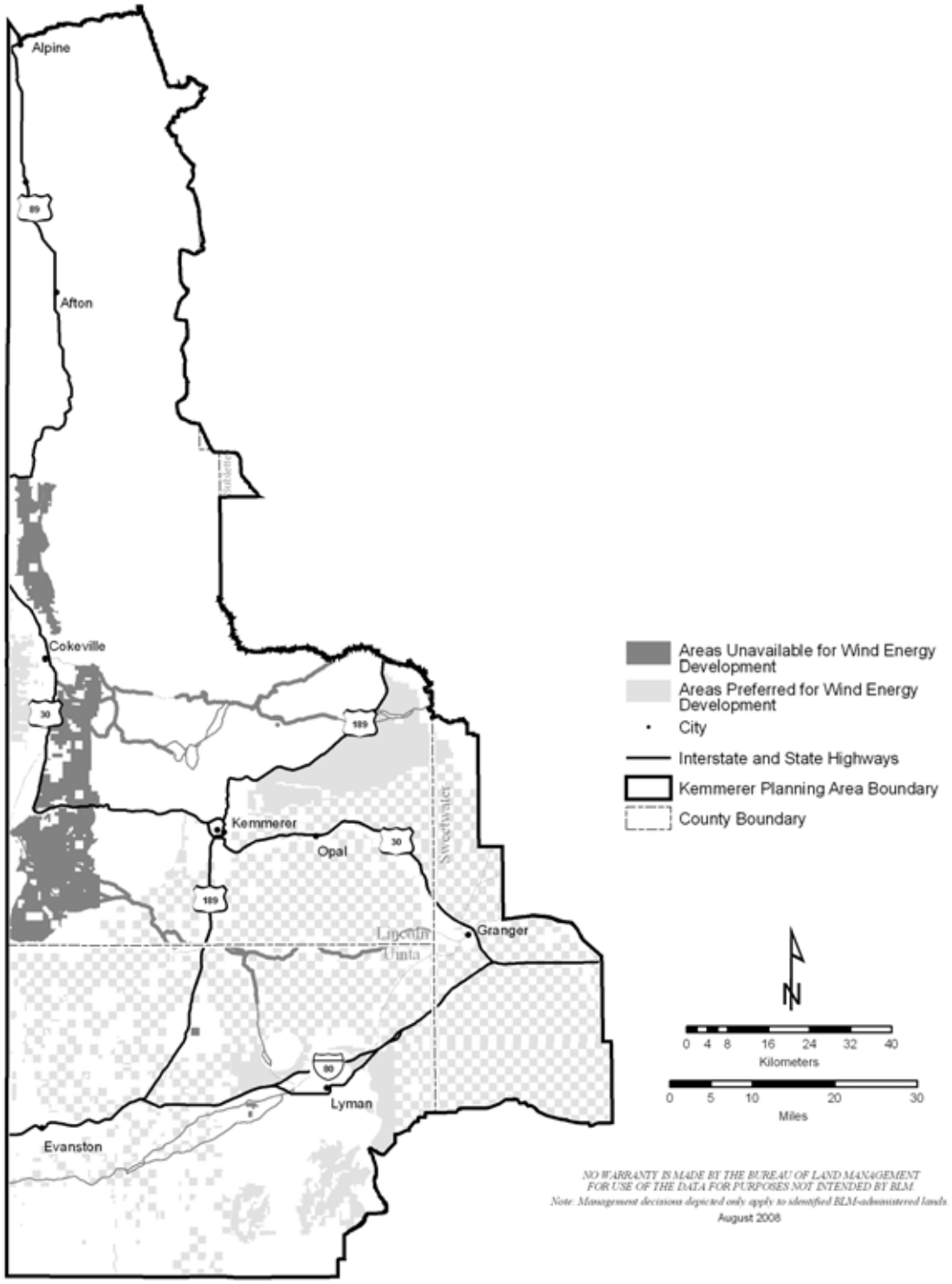
Alternative C

Under Alternative C, 97 percent of BLM-administered surface lands (1,376,607 acres) are identified as suitable for wind-energy development. Restrictions to protect Raymond Mountain WSA and the Bridger Antelope Trap prohibit wind-energy development. In general, management actions to protect soils; biological and cultural resources; and ROWs and corridors under Alternative C are the same as under Alternative A. Alternative C protects the physical trail trace of the NHTs based on their condition classification. The VRM classification under Alternative C is similar to Alternative A, but the Raymond Mountain WSA would be identified as Class I. The areas within 3-miles of high potential wind energy areas (per National Renewable Energy Laboratory data) would be Class IV, which is favorable for wind-energy development. Lastly, the Rock Creek/Tunp and Bear River Divide areas do not specifically prohibit high-profile structures, such as wind-energy facilities. Impacts to wind-energy development under Alternative C are anticipated to be similar to those identified under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the Kemmerer planning area is available for consideration of wind-energy projects where conflicts with other resource values are limited or can be mitigated. Under Alternative D, 55 percent of the BLM-administered surface (780,714) is identified as suitable for wind-energy development (see Map F). Alternative D identifies five preferred areas for wind-energy development (refer to Chapter 2). Surface disturbance from wind-energy development under Alternative D identifies approximately 67,200 acres in both the short term and long term. Restrictions from other resources impacting wind-energy development include surface disturbance management designed to limit soil erosion by consolidating road networks and equipment placement and avoiding surface disturbance in areas of sensitive or fragile soils, highly erosive soils, chemical and biological crusts, and in areas where slopes are greater than 20 percent. To protect biological resources, Alternative D minimizes construction disturbance to the smallest acreage possible, avoids habitat fragmentation in available special status species' habitats unless mitigation is initiated, and avoids new high-profile structures within 1 mile of occupied sagebrush obligate habitats. Alternative D designates and restricts ROW corridor placement to specific locations within the planning area, but variances would be considered on a case-by-case basis. To protect cultural and visual resources, a 1-mile viewshed protection area is established for specific NHT segments outside of the Dempsey area and a 3-mile viewshed is established around NRHP eligible cultural sites and some Class 1 NHTs under Alternative D. The viewshed of specific NHT segments is larger under Alternative D than compared to Alternative A. Under Alternative D, no wind-energy facilities are authorized in the Rock Creek/Tunp and Bear River Divide areas identified for management of other resource values. The identified restrictions combine to generally limit the area suitable for wind-energy development to south of U.S. Highway 189 and U.S. Highway 30 in the planning area. All of the above restrictions are anticipated to limit the development of wind energy in the planning area more than alternatives A and C, but not to the extent of Alternative B.

Map F. Availability of Wind Energy Projects in the Kemmerer Planning Area.



4.6.2.3 Conclusion

Restrictions developed to protect other resource values under alternatives B and D are the most constraining to wind-energy development, while alternatives A and C are the least constraining.

4.6.3 Rights-of-Way and Corridors

The purpose of the ROWs and corridors program is to accommodate the needs of the Kemmerer Field Office and respond to changing needs for ROWs and corridors in accordance with resources and activities that require them. This section identifies potential direct and indirect impacts to ROWs and designated corridors within the planning area. Refer to maps 40 and 41 for ROWs and corridors.

Impacts to ROWs and corridors include restrictions on accommodating new facilities. The ROWs and corridors program results in beneficial impacts to the programs it serves (generally oil and gas and utilities).

Direct impacts to ROWs include restrictions on accommodating new facilities, possible restrictions on ROW uses and, to some degree, changes in permitting timeframes. Indirect impacts may include restrictions on ROWs from resource values, special designations (e.g., ACECs), economics, and recreational areas.

4.6.3.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- ROW increase in conjunction with expanded oil and gas, utility, renewable energy and communication development.
- Corridors and communication site windows, also called ROW use areas, are designated as the preferred future locations for ROW and can be designated only in an RMP or plan amendment.
- ROW for smaller distribution facilities for minerals development and transportation, power and telephone services, and access roads are expected to remain at current levels, but could fluctuate with the degree of development.

4.6.3.2 Analysis of Alternatives

The types of impacts projected to occur because of the various alternatives are similar; however, the intensity of each impact is anticipated to vary by alternative. Management actions anticipated to impact ROW and corridors are described in general as impacts common to all alternatives and, more specifically, as impacts associated with individual alternatives.

Impacts Common to All Alternatives

The differences between the four alternatives involves the level of development that will result from other land uses and development (primarily oil and gas), as well as the levels of restrictions (avoidance and exclusion areas) on the locations of ROWs. All alternatives include restrictions on surface-disturbing land uses, including ROW. Several areas are considered conditional avoidance or exclusion areas because they can be determined only through site-specific surveys. These surveys, such as for greater sage-grouse nesting, pygmy rabbit, and black-footed ferret habitats, are performed prior to surface-disturbing activities, and affect the placement of ROWs and communication sites under all alternatives.

Corridors have a beneficial effect on oil and gas development and major utility projects. Major transporting pipelines benefit from placement in a corridor where land use conflicts have been eliminated

or reduced. Designated corridors are intended to reduce resource and land use conflicts as much as possible.

ROWs for telephone and fiber optics, pipelines (oil and gas and water), roads, and powerlines are linear disturbances and, due to the nature of the planning area land pattern, it will be difficult (if not impossible) to avoid BLM-administered lands by placing a project entirely on private lands. Disturbance associated with telephone and fiber optics and pipelines is limited to the short-term as the lands are reclaimed following construction. Each alternative includes 1,371 acres of short-term disturbance due to telephone and fiber optics, 6,000 acres of short-term disturbance from large-capacity (10- to 36-inch) pipelines, and 60 acres of short-term disturbance from water pipelines. Each alternative includes 1,740 acres of short-term and 1,732 acres of long-term disturbance from powerlines. With regard to communication sites, each alternative includes 28 acres of short-term disturbance and 22 acres of long-term disturbance. Other facilities include 365 acres of short-term and long-term disturbance.

Even though not currently required under Alternative A, the other alternatives would require that after initial surface disturbance pipeline trenches are not left open longer than 10 days to avoid cutting off migratory routes for wildlife and livestock. This would also ensure that open trenches are not left unattended in the event that wildlife, livestock, or the general public is in danger of falling into an unattended open trench. Pipeline gates would be required to ensure that livestock and wildlife are not cut off from water sources, and if needed, the public can cross a pipeline corridor. Soft plugs would also be used to keep wildlife from being trapped inside the pipe.

The impacts of individual ROWs include surface disturbance, fragmentation of habitat, and long-term loss of sagebrush vegetation. The impacts of corridors are the same as those created by individual ROWs; however, the impacts are intensified in designated corridor areas by confinement of many ROWs to a small area. Individual ROWs would disperse the same impacts over a greater land area.

Alternative A

Alternative A does not designate ROW corridors that could facilitate placement of ROW projects in the planning area. ROW exclusion areas (areas unavailable for location of any ROWs within BLM-administered surface lands) would not be established under Alternative A. Alternative A does provide protection for all historic, archeological, and cultural sites that are eligible for or listed on the NRHP; however, it does not prohibit establishment of ROWs in those areas. The VRM classification under Alternative A primarily protects the Raymond Mountain WSA, recreational sites and river corridors. Visual protections for NHTs, Bridger Antelope Trap, and sites eligible for or registered on the NRHP are limited to the visual horizon or ¼ mile. Management of the Raymond Mountain WSA under Alternative A strictly limits ROW placement based on the Interim Management Policy. This alternative also does not include specific decisions regarding location of communication sites. As such, placement of communication sites is limited only by constraints presented by avoidance and exclusion areas for other resources, including renewable energy projects. All ROW corridors are considered on a case-by-case basis.

Roads developed under Alternative A are primarily due to oil and gas development. Surface disturbance from roads includes 2,256 acres in the short term and 1,706 acres in the long term.

Alternative B

Under Alternative B, there will be 452,208 acres of ROW exclusion areas; ROW corridors total 81,642 acres. Alternative B precludes the designation of new ROW corridors through sites listed on the NRHP, and corridors are not designated where they conflict with NHT management objectives (see Map 40).

ROW corridors are limited within the BLM-administered surface. Preferred corridors are ¼-mile wide and include the following:

- New intrastate pipeline authorization linking the Jonah Gas/Pinedale Anticline Fields to existing plant sites in the planning area.
- New interstate pipeline authorization following the existing California and Pacific Coast States pipelines.
- Gathering pipelines for individual wells (6 inches or less in diameter) are to follow access roads associated with well pads.
- High-voltage powerline corridors are established north of and parallel to I-80, and along State Highway 89 from the junction of I-80 and the Wyoming state line.
- Fiber optic and low-voltage powerline corridors are located along currently established road systems (e.g., interstate or state highways and paved county roads) (see Map 40).

The federal lands within the following archeological and cultural sites within the planning area are exclusion areas to ROW placement: Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, and Bear River Divide trail landmark. These management actions result in an adverse impact to the ROW and corridors program compared to Alternative A, which has fewer restrictions. To protect cultural resource viewsheds and visual resources, Alternative B confines corridors to specific locations; prohibits wind-energy development in areas containing high resource values; establishes a 3-mile visual buffer around sensitive roads, NHTs, campgrounds, towns, and sites registered on the NRHP; preserves a 10-mile viewshed around specific sites; and establishes viewshed buffers around significant NHT segments in the planning area. The management actions identified for the Rock Creek/Tunp and Bear River Divide areas under Alternative B highly restricts the ability to place ROWs in these areas.

Alternative B includes the least amount of road development of the four alternatives, comprising 2,112 acres of short-term disturbance and 1,562 acres of long-term disturbance. In addition, Alternative B prohibits surface disturbing activities in special status plant and wildlife habitats which will limit ROW development opportunities in these areas. In addition, Alternative B buries all new low-voltage utility lines; requires installation of anti-perch devices on all new high-voltage utility lines; prohibits new, permanent high-profile structures within 1 mile of occupied sagebrush obligate habitats and prohibits new, permanent high-profile structures relying on guy wires for support in these habitats. These management actions result in adverse impacts to the ROW and corridor program compared to Alternative A.

Alternative B consolidates communication sites to the following areas: Quealy Peak, Medicine Butte, Hickey Mountain, and the BLM Wareyard. Alternative B presents the highest level of constraints to the placement of communications sites, resulting in an adverse impact to the ROW and corridors program.

Alternative B allows the lowest amount of surface disturbance of the four alternatives. For this reason, Alternative B is anticipated to have the greatest adverse impact to ROW and corridors due to having the most constraints to development of this resource use.

Alternative C

Alternative C designates utility corridors based on historic placement on a case-by-case basis, constraining the siting of utility corridors more than under Alternative A, but less than under alternatives B and D. Surface disturbance under Alternative C is the same as described under Alternative A. No

ROW exclusion areas will be established under Alternative C, however all significant historical, archeological, and cultural sites are protected or mitigated and the physical traces of NHT segments are protected based on their condition.

Communication sites are considered on a case-by-case basis under Alternative C. As such, limitations to the placement of communications sites are similar to that under Alternative A (i.e., constraints limited to avoidance and exclusion areas) and result in similar adverse impacts, but less adverse impacts compared to alternatives B and D. Potential impacts from renewable energy projects (other than wind energy) are the same as under Alternative B (i.e., no impacts are anticipated).

Alternative D (Proposed RMP)

Designation of ROW corridors under Alternative D is similar, but less restricting than as described under Alternative B. Under Alternative D, utility corridors are designated based on the type of use (e.g., powerlines, pipelines, and fiber-optic lines) and can be up to be 2-miles wide based on resource values (see Map 41). Sitings of fiber-optic and high-voltage and low-voltage powerline corridors are the same as under Alternative B, but variances are allowed based on application where conflicts with other resources are minimal or can be mitigated through resource-specific stipulations. ROW exclusion areas total 109 acres and ROW corridors are allowed within 539,968 acres of BLM-administered surface.

Surface disturbance associated with ROWs and corridors under Alternative D is the same as described under Alternative A. Limitations on surface disturbing activities are similar to Alternative B but less restrictive where projects can be successfully mitigated. To protect biological resources, Alternative D minimizes construction disturbance to the smallest acreage possible, avoids habitat fragmentation in available special status species' habitats unless mitigation is initiated, buries all new utility lines or requires installation of anti-perch devices on all new utility lines within sagebrush and (or) semiarid shrub-dominated habitats to avoid impacts, and avoids new high profile structures within 1 mile of occupied sagebrush obligate habitats, unless anti-perch devices are installed. The management actions identified for the Rock Creek/Tunp area under Alternative B highly restricts the ability to place ROWs in this area. Also, the management actions identified for the Bear River Divide area will place additional requirements on proponents to rehabilitate disturbances.

Alternative D establishes a 3-mile viewshed protection area around NRHP eligible cultural sites and some Class 1 NHTs, also a 1-mile viewshed protection area is established for specific NHT segments outside of the Dempsey area under Alternative D. The viewshed of specific NHT segments is larger under Alternative D than compared to Alternative A or C, but less than Alternative B.

Indirect impacts to ROW and corridors under Alternative D could include economic impacts to project proponents from the preference for locating major ROWs within designated corridors (versus more direct routes). Under Alternative D, 23 designated areas (refer to Chapter 2) are considered for communications sites. As such, Alternative D presents fewer constraints compared to Alternative B, but is more restrictive compared to alternatives A and C.

4.6.3.3 Conclusion

The amount of ROW development is essentially the same across the four alternatives for most types of ROWs, with the exception of roads under Alternative B, which are somewhat lower in number than under the other alternatives. Alternatives A and C introduce the lowest level of constraints to the placement of new ROWs and communications sites. Alternative B presents the highest level of constraints to the placement of new ROWs and communications sites, Alternative D is similar to Alternative B, although with fewer constraints.

4.6.4 Livestock Grazing Management

Allowable uses and management actions that limit, reduce, or prohibit livestock grazing or reduce animal unit months (AUMs) in the planning area are considered adverse impacts to livestock resources. Deterioration in rangeland health also is considered adverse to livestock grazing success. Restrictions on livestock grazing or AUMs to protect resource values are considered adverse impacts. Conversely, beneficial impacts to livestock grazing include those allowable uses or actions that improve rangeland health, increase AUMs, or decrease restrictions and costs to livestock grazing operations.

Direct impacts to livestock grazing from RMP alternatives are anticipated from actions that change AUM allocations or in any way restrict, prohibit, or allow additional livestock grazing on an area. For example, the BLM policy requirement for deferring two growing seasons of grazing following prescribed fire and wildland fire is considered a direct adverse impact to livestock grazing because it prohibits grazing. Indirect impacts to livestock grazing are anticipated from actions that change rangeland health and productivity or that change livestock grazing management on BLM-administered public lands within the planning area (e.g., change in grazing seasons). For example, to avoid direct AUM losses from herd reductions under the deferment of grazing following fire, the lessee may lease additional pasture, feed livestock for longer periods, or install additional fencing, all at additional economic costs. However, deferment also enhances vegetative recovery, which, over time, benefits livestock grazing through improved forage conditions. Another example of indirect impacts is the introduction of INNS by surface-disturbing activities that decrease forage availability, along with range productivity.

For the purpose of this analysis, short-term impacts to livestock grazing include activities that change the AUM allocation or rangeland health within 5 years of when the activity occurs. Long-term impacts are those remaining or occurring after 5 years. For example, the two-season grazing deferment following fire would be a short-term impact; a long-term beneficial impact to livestock grazing also may occur if the result is an increase in the quality or quantity of forage.

4.6.4.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- No net change in AUMs is expected in the planning area from implementing land-disposal and land-acquisition actions.
- All surface-use proposals are to be fully implemented during the planning period.
- Surface disturbances reduce the amount of forage (see Appendix M) available to livestock and wildlife and can be short- and long-term.
- Surface disturbances increase the likelihood for the introduction and spread of INNS, which degrade rangeland health and impact wildlife and livestock forage quality and quantity.
- To varying degrees, areas of concentrated wildlife and livestock use exist in most allotments (i.e., riparian and wetland areas, salting areas, fence corridors, etc.). Range improvements and managed livestock grazing methods disperse livestock and minimize livestock concentrations.
- Placement of salt and mineral supplements is one tool to reduce livestock concentration in riparian areas. Grazing practices can maintain, improve, or degrade rangeland health. The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) are designed to maintain or improve rangeland health. Approximately 10 percent of the public acreage in the planning area is evaluated annually.
- Managing wildlife and special status plants and wildlife can affect livestock grazing allocations.

- Managing for other resource uses can affect livestock grazing allocations and management.
- The BLM works with grazing lessees and permittees to identify and accomplish livestock grazing objectives. Over the last 50 years, rangeland health has improved across the planning area due to improved grazing management practices.

4.6.4.2 Analysis of Alternatives

Allowable uses and management actions potentially impacting livestock grazing include all surface-disturbing activities, restrictions protecting other resources, fire management, INNS control, and proactive livestock grazing management practices. These allowable uses and management actions may result in short- or long-term changes in AUM allocations and rangeland health. Although multiple factors influence AUM allocations and rangeland health, key planning issues identified during the scoping process identified surface-disturbing activities, restrictions protecting other resources, fire management, and INNS as the primary factors to be addressed by alternatives and analyzed in this section. Surface-disturbing activities and associated acreage are identified in Appendix M as part of the BLM's RFDs. Restrictions protecting other resources relate to inherit conflicts between competing resources and uses of the public lands, and the challenges of managing for multiple uses.

Impacts to livestock grazing management are described and organized according to (1) changes in AUM allocations, (2) changes in rangeland health, and (3) management actions. The description of management actions includes actions restricting livestock grazing, as well as actions that benefit livestock grazing. Refer to Map 42 for livestock grazing allotment management categories, parcels not included in grazing allotments, and livestock trails in the planning area.

Impacts Common to All Alternatives

The types of impacts projected to occur to livestock grazing management because of each alternative are similar and include changes in AUM allocations and rangeland health. The factors causing these impacts primarily include surface-disturbing activities, restrictions protecting resource values, fire and fuels management, INNS, and proactive management actions. Changes in AUM allocations and rangeland health, and the associated causative factors of these changes, are described below as impacts common to all alternatives. How the intensity of these impacts varies by alternative is described under individual alternatives.

Livestock grazing continues to occur within the majority of the planning area under all alternatives. In addition, current allotment categories (M, C, and I) and current livestock trails are maintained under all alternatives. The Standards *for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) will be applied, regardless of alternative. Vegetation treatment projects designed to benefit rangeland health also are anticipated to occur under all alternatives.

Over the life of the plan, it is estimated that to achieve or maintain the desired future condition (DFC) for rangelands, mechanical and chemical treatment and prescribed fire need to occur in the planning area. Mechanical treatment of rangeland includes the mowing of sagebrush and the mowing or shredding of limber pine and juniper. This treatment is done to increase forage production and improve forage quality, as well as to facilitate grazing management activities (e.g., moving livestock between pastures). Chemical treatments are implemented to thin stands of sagebrush for improved forage production and to facilitate grazing management objectives, as well as to supplement INNS control activities in specific areas of the planning area. Prescribed burns are used to attain DFC, such as maintaining rangeland in a specific seral condition and to achieve wildlife, livestock, and watershed management objectives.

The analysis of alternatives is based on existing conditions and considers that over the last 40 to 50 years, an improvement in range conditions has occurred (see Livestock Grazing in Chapter 3). Such improvement is due largely to improved grazing management practices, development of range improvement projects (e.g., fences and water developments), and, in some cases, reduction in livestock numbers or change in kind of livestock. To various degrees, improvements in range conditions generally are anticipated to continue under all alternatives based on vegetation treatment, range-improvement projects, and development of guidelines for areas determined as not meeting rangeland health standards. INNS are one factor that may adversely impact the improving trend.

Under all alternatives, it is anticipated that throughout the planning area, the development and maintenance of springs impact approximately 125 acres, well installation 30 acres, water pipeline installation 150 acres, reservoir maintenance 29 acres, and fencing approximately 600 acres (Appendix M). Adverse impacts associated with these improvement projects generally are considered short-term, as vegetation typically is reclaimed within two to three growing seasons. While adverse impacts associated with the construction of these facilities are short-term, the long-term impacts of these actions are designed to be beneficial. For example, new fences and new water developments are expected to change livestock grazing patterns and distribution within the allotment, resulting in long-term beneficial impacts. Moreover, congregation of livestock and wildlife around natural water sources and trailing patterns also are expected to improve because of constructing these facilities. Overall, the long-term impacts from these facilities are anticipated to be a beneficial improvement to rangeland health. Rangeland improvement projects allow livestock managers and permittees/lessees to better implement grazing management practices and manage the distribution and movement of livestock within allotments. BLM fencing standards, whether applied to new fencing or used to modify existing fencing to eliminate conflicts with wildlife may affect livestock grazing management. Management actions developed for wildlife travel and migration corridors, as well as active raptor nests, also may have an impact to livestock management options.

Changes in AUM Allocation

Changes in AUM allocations within the planning area may occur for several reasons, but are expected to be limited to specific allotments and to be relatively small changes compared to the total AUM allocations for the planning area. In many cases, a change in AUM allocations reflects a change in management of livestock within an allotment, or a change in management of another resource that affects livestock. For example, if grazing management and (or) range improvement projects have increased the overall productivity of an allotment, then it may be appropriate to increase the number of AUMs permitted under the grazing lease or permit for that allotment. Conversely, if forage productivity changes due to surface disturbances, fire, wildlife (e.g., elk, prairie dogs) use, INNS increases, and (or) if monitoring indicates a downward trend in rangeland health, the number of AUMs permitted in an allotment may decrease. The number of AUMs permitted in an allotment also may decrease if it is discovered that the number of AUMs originally permitted over-allocated the forage resource. This may occur in allotments where features, such as rock outcrops, steep slopes, rock or bare ground, or other factors limiting forage utilization by livestock, were not adequately accounted for when AUMs were originally allocated.

Any potential changes to AUM allocations are based on the amount of available forage in an allotment as determined through monitoring or other means (43 CFR 4110.3-2[b]). The number of AUMs permitted in an allotment may be increased, cancelled, temporarily suspended, indefinitely suspended, or authorized not to be used (temporary nonuse). Temporary non-use status is reevaluated on an annual basis. Changes in AUM allocations have more impact on individual allotments and lessees than they do to AUM allocations in the entire planning area.

Management actions potentially affecting the availability of AUMs within the planning area include land disposal, development, and associated surface disturbance, management of additional sustained yield forage, availability of AUMs on acquired lands, designation of forage reserve, closure of areas to livestock grazing to protect resource values, and management actions related to drought and wildland fire. Any changes in AUM allocations affect revenues generated by grazing fees, as well as individual lessees and their annual profit margins.

Land disposal could occur throughout the planning area; however, the most disposal acreage is identified in Uinta County in the southern portion of the planning area. Additional lands are identified for consideration for disposal in the center of the planning area in Lincoln County. The least acreage identified for potential disposal is in northern Lincoln County. All lands identified for consideration for disposal are isolated and generally surrounded by private land. The majority of land disposed likely will continue to be grazed under different (e.g., private) ownership; however, grazing fees will no longer be collected by the BLM for these areas. Frequently, land disposal is tied to land exchanges, resulting in no net change in AUMs, or only a slight increase or decrease in AUMs. Land exchanges between the BLM and private entities typically result in the BLM acquiring fewer acres of higher overall quality than the acreage disposed, resulting in a reduction in the number of acres managed by the BLM. However, the impact on overall AUMs in the planning area cannot be predicted due to the differences in forage production among sites. In addition, the Kemmerer Field Office targets lands for acquisition that help to consolidate public lands into larger blocks, making management more efficient. Therefore, land disposal and acquisition may or may not occur in the same allotment. Consequently, land exchange frequently has a more dramatic impact on specific allotments than on the total number of AUMs in the planning area.

Development and associated surface disturbance on public lands can result in the direct removal of forage available to livestock. As shown in Table 4-1 and Appendix M, projected surface disturbance is anticipated to result in short- and long-term removal of forage. Rangeland health and forage production can be directly and indirectly affected by surface disturbance through the loss of forage, spread of INNS, and soil erosion. The majority of direct and indirect impacts of surface disturbance are projected for wind-energy development, road construction, mineral development, and development and maintenance of associated infrastructure such as pipeline or transmission ROWs.

When compared to other minerals, oil and gas development is anticipated to cause the most long-term surface disturbance and, hence, the most adverse impact on livestock grazing in the planning area. Fifty-six allotments administered by the Kemmerer Field Office are in areas considered as having a high-to-moderate potential for oil and gas development. All or portions of these 56 allotments are, therefore, likely to be affected by oil and gas development under one or more of the alternatives. Both short-term and long-term impacts to AUM allocations may occur; the long-term impacts are of greater concern to livestock grazing. The degree of impact depends on the rate of development, production success, and how quickly disturbed areas are reclaimed. For example, it is expected that disturbed areas associated with nonproducing wells will be reclaimed quickly and AUMs taken out of production by vegetation removal would be restored in the short term. On the other hand, for producing wells, it will likely take more than 5 years (long term) before disturbed areas are reclaimed and made available for grazing use. Reducing AUMs is local in nature since development is unlikely to occur simultaneously across the entire area (e.g., all wells developed at the same time). The impact on AUM allocations could be substantial for individual allotments, but the overall impact of disturbance from oil and gas development on AUMs in the planning area is expected to be negligible.

In some instances, oil and gas development can benefit livestock by increasing the number of water wells available for livestock watering, thereby improving livestock distribution in an allotment. In other words, wells developed through oil and gas development can, in some instances, be converted to water wells for use by livestock and wildlife.

Subdividing base property for recreation or housing developments is a recent activity that could potentially impact the BLM's ability to effectively manage adjacent public lands for grazing. Subdividing would primarily impact individual grazing allotments and could result in breaking allotments into smaller units or in canceling the grazing lease/permit entirely. In addition to the addition of structures, subdivisions generally result in more vegetation removal and surface disturbance for roads, fences, powerlines, and other facilities—all of which can fragment habitat and increase the opportunity for spread of INNS. The long-term impact could result in loss of AUMs and degradation of rangeland health.

Long-term disturbances due to development on lands not administered by the BLM are expected to be greater than projected long-term disturbances on BLM-administered lands for all alternatives (Appendix M).

There is potential to increase available AUMs with the management action to close all unauthorized roads and two-track routes and those not needed for management purposes, and reclaim them back to their native condition.

Changes in Rangeland Health

Several natural and manmade factors can adversely affect rangeland health and productivity within the planning area. Natural factors include climatic cycles, such as drought; overpopulation of wild ungulates; and catastrophic events (e.g., flashfloods or wildland fires). Manmade factors within the planning area generally include improper grazing, prescribed fire, surface disturbances, and INNS.

Breaking up soil crust that restricts infiltration and inhibits seedling establishment and increasing cover and vigor of native vegetation are two ways of improving forage conditions for livestock grazing. Increased cover and vigor of native vegetation could minimize soil erosion. The health of riparian and wetland areas also can be affected by grazing management and implementing range improvement projects. Wildlife can cause similar types of adverse impacts to an allotment as those described for livestock when groups of native ungulates congregate in an area.

All alternatives strive to prevent improper grazing through implementing the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management* (BLM 1998a). Therefore, it is anticipated that the degree and extent of grazing-related impacts on public lands over the long term should continue the current trend of improvement.

Fire can have both beneficial and adverse impacts on livestock grazing management. In the short term, fire burns forage that livestock depend on and can damage facilities such as fences. This damage can have a substantial adverse economic impact on grazing operations by requiring leasing of additional pasture, feeding livestock for longer periods, building or repairing fences, and reducing herd size. BLM policy requires deferment of livestock grazing following prescribed fire or wildland fire for a minimum of two growing seasons. However, the total length of deferment beyond two growing seasons depends on the severity of the fire and the types of restrictions placed on grazing use on public land. In the long term, fire may improve the quality and quantity of forage, thereby improving flexibility in managing livestock.

Both prescribed and wildland fires can increase the extent of INNS found on an allotment. The extent that fire degrades rangeland health through propagation of INNS typically depends on the proximity to a source of INNS seed, the type of vegetation community burned, and fire severity. For example, within the planning area, fires in mountain big sagebrush communities appear to be more resistant to cheatgrass infestation following a fire than other vegetation communities (e.g., mountain mahogany). Fire management using prescribed fire can benefit livestock grazing by improving the quality, quantity, and

availability of forage for livestock. Prescribed fire also can help meet specific management objectives, such as improving distribution of livestock or removing dense stands of brush. However, use of prescribed fire is less likely in areas with mineral and energy development. Fire-suppression activities can limit the loss of livestock, short-term loss of forage, and in some cases, the long-term damage to vegetation caused by fire, but it also can increase the likelihood of INNS spread into an allotment. The long-term impact of repeated fire suppression is the buildup of hazardous fuels and the increased risk of severe or catastrophic wildland fires.

One of the primary indirect impacts of surface disturbance affecting rangeland health and productivity is the spread of INNS. INNS displace native vegetation and, because they typically are unpalatable to livestock and wildlife, remain ungrazed. This places more strain on remaining native vegetation to support grazers, giving INNS an additional advantage over native vegetation in their competition for water, nutrients, and light. Invasion of some weed species (e.g., cheatgrass) can alter the fire regime of an area, causing long-term adverse impacts to livestock grazing. Surface-disturbing activities typically include mechanized or mechanical disturbance, such as construction of well pads, roads, pits, reservoirs, pipelines, and powerlines; mining; and vegetation treatments. Although typically reclaimed, these activities can increase INNS infestations and soil erosion within allotments in both the short and long term. Land reclaimed from oil and gas or other activities generally has a short-term beneficial impact on rangeland productivity due to the reseeding and subsequent growth of native grasses.

Dust caused primarily by roads, is another type of indirect impact. Dust can affect rangeland health and productivity and decrease the palatability of forage for livestock and wildlife.

In areas accessible to livestock, vegetation treatments, such as forest clear-cutting and thinning, can indirectly benefit livestock grazing by allowing more light to reach understory vegetation, thereby increasing herbaceous growth and temporarily increasing the amount of available forage to livestock. However, the authorized use of the area is unlikely to change.

Management Actions

Management actions designed to protect resource values (e.g., special status species) may adversely impact livestock grazing management by restricting grazing in certain areas. Conversely, some management actions are designed to benefit livestock grazing management (see Chapter 2, description of alternatives). Management actions of both types are described in this section. Impacts resulting from these actions anticipated to vary by alternative are described under individual alternatives.

Managing cultural resources can restrict the location and design of rangeland improvement projects and, consequently, grazing systems. For example, avoidance of cultural resource sites that are eligible for or listed on the NRHP, limitations on activities located adjacent to historic trails, and activities impacting the historic landscape, may limit the BLM's ability to construct rangeland improvement projects in an allotment aimed at better management of livestock. In addition, cultural resource management can delay construction of range-improvement projects by requiring additional surveys and designing changes in projects to avoid important cultural sites.

Management for plant and wildlife species designated as threatened or endangered under the ESA or designated as sensitive species by the BLM can affect livestock grazing in allotments where these special status species occur. Specifically, restrictions on the type, location, or period that grazing or range improvement activities are allowed could limit livestock management options in allotments where sensitive species occur. For example, surface use restrictions could affect development or placement of range improvement projects and potentially affect the ability of the BLM or a grazing operator's ability to implement grazing management practices. In addition, special status species management can increase

costs to livestock grazing operations by requiring additional surveys and design changes to projects. Water developments for livestock located on BLM-administered land in the Colorado River Basin (part of the planning area) need to consider potential adverse consequences. The concern is that by providing water for livestock, which is destined to become part of the Colorado River Basin, could deplete water needed for threatened and endangered fish species downstream. In sagebrush habitats, where greater sage-grouse or other sagebrush-dependent species may occur, the placement of range improvement projects, season of grazing use, level of grazing use, use of prescribed fire, adjustments in grazing preference, and seasonal restrictions all may be affected. Conversely, a BLM focus on avoiding habitat fragmentation in special status species habitats would benefit rangeland health and therefore livestock grazing. Where management actions are proposed for prairie dogs, livestock grazing may be affected. Although the white-tailed prairie dog is not listed as threatened or endangered, it is a BLM-sensitive species and an important food source to raptors. It also provides habitats for the burrowing owl and the black-footed ferret.

Special status plant species are known to or may occur in the planning area (see Special Status Species – Plants). Special considerations for the management of these plant species as they are discovered, or if critical habitat is designated, also could impact livestock grazing. To prevent trampling by livestock, water developments and placement of salt, mineral, or forage supplements for livestock are not allowed in areas inhabited by special status species or other sensitive areas under all alternatives; however, the size of the buffers vary by alternative. Any sort of buffer may restrict the placing and (or) timing of constructing range-improvement projects and, therefore, adversely impact livestock grazing by limiting management flexibility.

Resource management actions pertaining to fish and wildlife management, special status species management, mineral development, lands and realty management, OHV use, recreation use, MA management, INNS management, fire management, soil management, and vegetation management could affect livestock grazing both adversely and beneficially. Actions anticipated to substantively impact livestock grazing are identified by alternative under the headings "Changes in AUM Allocations" and "Changes in Rangeland Health," below.

Alternative A

Changes in AUM Allocations

Other than one developed campground and a few small parcels, which are not permitted or leased for livestock grazing, the planning area is open to livestock grazing and management is organized under 224 grazing allotments. Additional sustained yield forage has not been identified in the planning area, although if the forage was available it could be allocated for livestock use under Alternative A.

No forage reserve is designated for the Christy Canyon allotment under Alternative A. Livestock operators in the Lost Creek/Ryan Creek allotments are held to the current permitted use and the 827 AUMs associated with the private land acquisition are allocated for wildlife use. Livestock grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed under Alternative A, but only as a management tool for enhancement of wildlife values and only on a temporary, nonrenewable basis.

Currently, approximately 157,249 AUMs are being actively utilized in the planning area. Over the life of the plan, authorized use reductions could occur if monitoring indicates a need for change (43 CFR 4110.3-2), which would adversely impact livestock grazing management. Approximately 15,556 AUMs are anticipated to be lost over the life of the plan primarily due to the 144,673 acres of projected long-term surface disturbance under Alternative A (Table 4-1). This is the highest of the alternatives for long-term surface disturbance and could change the way AUMs are allocated, having an economic impact on ranching interests.

Changes in Rangeland Health

The current grazing systems and range improvements in the planning area are designed to achieve management objectives for livestock grazing. The focus of management is to improve Category I allotments and maintain category M and C allotments. Approximately 10 percent of public land acreage in the planning area is evaluated annually to determine whether it meets standards for healthy rangelands. The evaluation includes an assessment of soil erosion condition and stability. Indirect adverse impacts to rangeland health under Alternative A are anticipated from the spread of INNS and an increase in soil erosion, which is a typical result of increased surface disturbance.

The locations of livestock salt and mineral supplements generally are determined on a site-specific basis; however, they are not allowed in areas of special status plant species under Alternative A. In addition, range improvement projects are not allowed on special status species populations under Alternative A, adversely impacting livestock grazing management on small areas.

Alternative B

Changes in AUM Allocations

Other than one developed campground and a few small parcels that are not permitted or leased for livestock grazing, the planning area is open to livestock grazing, and BLM management remains organized under 224 grazing allotments. Additional sustained yield forage will not be activated for livestock use under Alternative B, similar to Alternative A. Under Alternative B, the Christy Canyon allotment is designated as a forage reserve (up to 1,248 AUMs) managed by priority criteria identified in Appendix B. Designating a forage reserve could have direct beneficial impacts on livestock grazing management by providing BLM and livestock operators more flexibility during an emergency (i.e. wildland fire, drought) or after vegetation treatment. Livestock operators in the Lost Creek/Ryan Creek allotments comply with the same restrictions identified for Alternative A. Ryan Creek/Lost Creek (Lost Creek Coordinated RMP Area), sensitive cultural sites, oil- and gas-production facilities, and the Mike Mathias Wetlands at Wheat Creek Meadows are not available for livestock grazing under Alternative B, thereby reducing available AUMs and adversely impacting livestock grazing management more than Alternative A in these areas. However, over the life of the plan, approximately 5,128 AUMs are anticipated to be lost to long-term surface disturbance under Alternative B, which is the least of all alternatives.

Changes in Rangeland Health

Rather than improving range conditions on Category I allotments and maintaining conditions on category M and C allotments, as described under Alternative A, Alternative B implements grazing systems and range improvements to enhance watershed, riparian, and wildlife values, while reducing livestock conflicts with other resources. Even though this alternative includes the least amount of new surface disturbance and development, ranching interests may be affected economically by the shift in emphasis from livestock grazing to wildlife. Less indirect adverse impacts in rangeland health under Alternative B are anticipated from the spread of INNS because projected surface disturbance is less than for all other alternatives.

Restrictions designed to protect habitat health under Alternative B, may also affect range improvement project development. The locations of livestock salt and mineral supplements are prohibited within ½ mile of special status plant species, water sources, riparian areas, NHTs, and aspen stands. In addition, range improvement projects are not allowed within ½ mile of special status plant species populations unless they benefit the plant species, or in areas identified as having poor topsoil (i. e., badlands, saline bottomlands, sodic, high pH, or calcarious). Surface disturbance prohibitions include within ¼ mile of or

within 100-year floodplains, wetlands, riparian areas or perennial streams; and prohibitions in areas supporting cushion plant communities and in designated MAs.

Recreation management changes that may have beneficial effects to livestock management include those proposed for SRMAs at Pine Creek Canyon and Raymond Mountain. Benefits to rangeland health may occur by proposed restrictions on activities that can degrade soils and disrupt livestock activities such as camping and OHV and snowmobile use. Beneficial impacts for rangeland health under the proposed Dempsey Ridge SRMA, and the Rock Creek/Tunp and Bear River Divide MAs include restrictions on OHV use and new mineral sales, leasing, exploration and development; limiting ROW actions to existing corridors; and no new road developments. The general management action to designate no areas within the planning area open to OHV use under Alternative B also protects rangelands from damage.

Adverse effects to livestock management in the area may occur from additional salt lick and mineral supplement restrictions to those listed above within the Dempsey Ridge SRMA and for the two proposed MAs that include ½ mile from sensitive wildlife areas and specified cultural sites. Proposed changes in travel management under Alternative B to limit motor vehicles to crowned and ditched roads may adversely affect livestock managers' access to rangeland improvements and livestock. Also, no designations of areas open to OHV use under Alternative B may increase forage vegetation loss in the greater planning area since recreational OHV users will not have a designated off-road area. Stricter VRM buffers for cultural resources, campgrounds, and towns may adversely affect placement of range improvement developments. These restrictions are anticipated to reduce flexibility in management and, therefore, adversely impact livestock grazing operations more than for Alternative A.

Alternative C

Changes in AUM Allocations

Under Alternative C, the entire planning area is open to livestock grazing and management remains organized under 224 grazing allotments. In addition, livestock grazing is authorized on small isolated tracts currently not permitted or leased for grazing. Additional sustained yield forage can be activated for livestock use under Alternative C, thereby benefiting livestock grazing operations more than Alternative A.

Forage reserve allotments are not designated under Alternative C. The 827 AUMs associated with the Lost Creek/Ryan Creek allotments are available for both livestock and wildlife use, thereby increasing available AUMs for livestock compared to Alternative A. Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed under Alternative C without the requirement for enhancing wildlife values as required under Alternative A. Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is anticipated to provide more forage, and therefore, benefit livestock grazing management more in the short term and long term compared to Alternative A. Over the life of the plan, approximately 15,534 AUMs are anticipated to be lost to long-term surface disturbance, which is similar to Alternative A and more than under Alternative B.

Changes in Rangeland Health

Under Alternative C, grazing system and range improvements are designed to maximize livestock grazing while maintaining other resource values. Indirect adverse impacts in rangeland health similar to those described under Alternative A are anticipated under Alternative C due to the similarity in projected long-term surface disturbance.

The locations of livestock salt and mineral supplements generally are determined on a site-specific basis; however, they are not allowed in areas of special status plant species. In addition, range improvement

projects are not allowed on special status species populations under Alternative C. These restrictions will restrict livestock grazing management flexibility and are anticipated to have the same impacts to livestock grazing as Alternative A.

Alternative D (Proposed RMP)

Changes in AUM Allocations

The planning area remains open to livestock grazing and management remains organized under 224 grazing allotments. The livestock grazing use on public lands in vacant allotments and unallotted parcels is a discretionary action. The BLM can consider issuing 10-year renewable permits, temporary, nonrenewable permits, or not issuing grazing permits for small isolated parcels that currently are not permitted or leased for livestock grazing. Additional sustained yield forage can be activated for livestock use under Alternative D, unless the results of an evaluation based on the Wyoming Standards for Healthy Rangelands, range surveys, monitoring data, or other information determine that adequate forage is not available. Due to the relatively small size of the isolated parcels and small amount of additional sustained yield forage, the beneficial impact of these actions is expected to be relatively minor and localized. Overall, the flexibility in management associated with Alternative D actions is anticipated to benefit livestock grazing management in the short term and long term.

The Christy Canyon allotment is designated a forage reserve, similar to Alternative B and is anticipated to result in similar long-term beneficial impacts by increasing flexibility for livestock grazing operators during an emergency or after vegetation treatments. Livestock operators in the Lost Creek/Ryan Creek allotments comply with the same restrictions identified for Alternative A. Grazing within the Mike Mathias Wetlands at Wheat Creek Meadows is allowed as described for Alternative A, resulting in similar impacts. Approximately 8,338 AUMs are anticipated to be lost over the life of the plan because of long-term surface disturbance, which is less than under alternatives A and C, more than under Alternative B.

Changes in Rangeland Health

Under Alternative D, grazing system and range improvements are designed to achieve management objectives. Indirect adverse impacts in rangeland health under Alternative D are anticipated from projected surface disturbance and associated spread of INNS; however, because projected long-term surface disturbance is less, anticipated impacts also will be less compared to Alternative A.

The locations of livestock salt and mineral supplements generally are not allowed within ¼ mile of special status plant species, water sources, riparian areas, NHTs, or aspen stands. Buffers to provide additional protection of resource values are considered on a case-by-case basis. In addition, range improvement projects are not allowed on special status species populations under Alternative D and buffers are considered on a case-by-case basis. Stricter VRM buffers for cultural resources and other high quality scenery, and town viewsheds may adversely affect range improvement developments.

Recreation management that may have beneficial impacts on rangeland health under the proposed Pine Creek Canyon and Raymond Mountain SRMAs include proposed restrictions on activities that can degrade soils and disrupt livestock activities such as dispersed camping and OHV and snowmobile use. Rangeland health benefits from the proposed Dempsey Ridge SRMA and both MAs include the goal of no new mineral leasing and no further loss of habitat with mineral development, which may adversely affect range improvements. Reclamation of unnecessary roads is included in the SRMA and the Bear River Divide MA actions. In addition to salt lick and mineral supplement restrictions listed above, restrictions within the Dempsey Ridge SRMA include ¼ mile from specified cultural sites, which may have adverse effects to livestock management in the area. In the two proposed MAs, salt lick and mineral supplement restrictions include ¼ mile from sensitive wildlife areas (e.g., sage-grouse leks).

Restrictions on placement of supplements and range improvement projects will limit flexibility of livestock operations; however, the case-by-case management approach under Alternative D is anticipated to minimize adverse impacts to operators from these restrictions more than under Alternative A.

4.6.4.3 Conclusion

Although Alternative B projects the least acreage of surface disturbance and, therefore, is anticipated to reduce AUMs the least of all alternatives, it is the most restrictive on livestock grazing and, therefore, is anticipated to have the most adverse impact on livestock grazing management compared to all alternatives. The Christy Canyon allotment forage reserve designated under alternatives B and D is anticipated to benefit livestock grazing in the long term. However, in the short term there could be an adverse impact to livestock grazing in general because this forage may be taken out of the forage base in certain years. Alternatives A and C project the most acreage of surface disturbance and are the least restrictive on livestock grazing and, therefore, are anticipated to have similar adverse and beneficial impacts on livestock grazing. Alternative D projects the second lowest acreage of surface disturbance and is less restrictive on livestock grazing compared to Alternative B. The relatively low surface disturbance and greater management flexibility associated with Alternative D are anticipated to result in the most beneficial impacts to livestock grazing compared to other alternatives.

4.6.5 Recreation

This section describes the impact of each alternative on recreational uses of public lands in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts are described as beneficial or adverse.

Direct impacts to recreation affect recreational use of public lands and facilities. For example, certain resource development actions might displace recreational uses from a given area, thus directly impacting recreation. An example of an adverse indirect impact is when competing uses of the land affect wildlife habitats, resulting in a decrease in big game populations and, therefore, a decrease in hunting (recreational) opportunities. Beneficial impacts to recreational resources include actions that improve the recreational setting, contribute to better recreational experience opportunities, and ultimately contribute to increased benefits from recreational use of public lands. Adverse impacts are those that negatively affect the recreational setting, detract from the recreational experience opportunities of users, or decrease benefits from recreational uses. Refer to maps 43 through 45 for recreation alternatives.

4.6.5.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- A site-specific analysis normally is conducted on the ground as RMP decisions are implemented.
- The BLM will not administer Bureau of Reclamation (Reclamation) lands. Only two resources involving Reclamation lands are addressed in this document: (1) campgrounds on Reclamation lands administered by the BLM for which the Reclamation pays the BLM, and (2) livestock grazing.
- The identification of SRMAs is assumed to benefit recreation compared to not identifying SRMAs.

4.6.5.2 Analysis of Alternatives

Analysis of potential impacts to recreation from alternatives considered management actions most likely to disrupt, prevent, or benefit recreational opportunities within the planning area. The location and intensity of projected mineral development in the planning area also were considered. Impacts to recreation are anticipated under all alternatives; however, the intensity of these impacts is expected to

vary by alternative. Back Country Byways are discussed under the Special Designations section. Impacts to OHV use and visual resources are discussed in their respective sections.

Impacts Common to All Alternatives

Under all alternatives, activities related to resource development (e.g., construction of facilities, land clearing, and drilling activities related to minerals exploration and development; ROWs; and transportation) may result in adverse impacts to, the displacement of recreational opportunities, or the degradation of recreational experiences for the life of those projects. Conversely, some development activities present opportunities to improve legal access to public lands, as well as to improve roads, thereby improving recreational opportunities. In addition, management actions limiting development activities (e.g., no surface-disturbing activities, CSU restrictions, and "no-leasing" restrictions) and mineral withdrawals could benefit recreation by protecting recreational facilities and providing long-term assurance that areas traditionally used for recreational purposes will not be affected by future development activities.

Table 4-12 shows the SRMAs proposed under the alternatives. By identifying SRMAs, the respective areas become a higher priority for recreational management. SRMAs are anticipated to allow the BLM to respond to the need for more intensive management efforts, including construction funding for recreational facilities. If an area is not identified as an SRMA, it is an Extensive Recreation Management Area (ERMA). In an ERMA, recreation management objectives are identified, but are a lower priority, actions are custodial in nature and limited to addressing visitor health and safety, user conflict, and resource protection issues. Additional information on management of SRMAs and ERMAs in the planning area is identified in Appendix I.

Table 4-12. Recreation Management Areas by Alternative

Area	Alternative A	Alternative B	Alternative C	Alternative D *(Proposed RMP)*
Pine Creek Canyon	–	SRMA	SRMA	SRMA
Raymond Mountain	–	SRMA	SRMA	SRMA
Oregon-California National Historic Trail	–	SRMA	SRMA	SRMA
Remainder of Planning Area	ERMA	ERMA	ERMA	ERMA
Dempsey Ridge	–	SRMA	SRMA	SRMA

ERMA Extensive Recreation Management Area
SRMA Special Recreation Management Area

Recreational visitation is affected by population growth and the relative attractiveness of recreational opportunities. Alternatives promoting industrial development encourage population growth in both the short and long terms, resulting in an increase in the demand for recreational use of public lands. Alternatives enhancing recreational resources increase their relative attractiveness, thereby increasing recreational demand. Recreational visitation increases accordingly. Public use of special management areas that are adjacent to private land could adversely impact the private land owners due to impacts such as increased erosion on trails or access routes, livestock/recreational user conflicts, and increased trash and other debris.

Fish- and wildlife-dependent recreational opportunities increase or decrease in proportion to the overall productivity of habitats. Habitat management resulting in fish and wildlife population increases impacts recreational visitation. Habitat loss in response to allocation of lands and resources to competing industrial development could cause population decreases that, in turn, decrease recreational visitation and result in a long-term adverse impact.

As a state with a substantial tourism market, nonresident recreationists benefit from Wyoming opportunities, as well as provide economic benefits to the state. Nonresident visitation could be affected by the various alternatives; however, the level of impact on recreation in the planning area is not anticipated to be substantive. These impacts are discussed under the individual alternatives. Annual growth rates for nonresident recreation recently were estimated in a U.S. Forest Service (USFS) study (Betz et al. 1999), providing the basis for this analysis.

Alternative A

Recreation Management

Surface-disturbing Activities. Under Alternative A, the projected long-term surface disturbance from BLM actions results in the highest disturbance acreage of all alternatives (refer to Table 4-1). These management actions could cause direct and indirect adverse impacts to recreational resources as conflicts between recreational use and development occur in developed areas. The quality of dispersed recreation will diminish over time in areas where large-scale development occurs. The impacts to recreation from surface-disturbing activities under Alternative A, while minor, are anticipated to be adverse and similar in type to all other alternatives.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative A are anticipated to be beneficial and similar in type to all other alternatives. The greater the acreage withdrawn or excluded from development, the greater the beneficial impact to recreation. Alternative A withdraws or closes little to no acreage; therefore, it is considered the least beneficial to recreational uses of the land.

Special Recreation Management Areas

Under Alternative A, no SRMAs are proposed for the planning area. The entire planning area would be managed as an ERMA. Recreation management objectives for the ERMA would be developed to address visitor health and safety, user conflict, and resource protection. Recreational management actions would be restricted to custodial actions adversely impacting recreational resources.

Recreational Use

Other Resource Management Actions. Consolidating land ownership and additional public access to lands within the planning area increases recreational opportunities for recreational users seeking both primitive and more-developed recreational experiences.

Managing certain resources could influence recreational use patterns, opportunities, and preferences within the planning area to a limited extent. For example, current management actions for vegetation, water, soil, livestock grazing, and fire management are anticipated to influence the distribution of fish and wildlife throughout the planning area, thereby influencing recreational use. Increases in fish and wildlife populations translate to increased recreational opportunities, such as hunting, fishing, and viewing wildlife.

Cultural, paleontological, and VRM limitations could preclude the development of recreational facilities and opportunities in localized areas by protecting resources of interest. Forest-management activities

temporarily displace recreational use from areas where vegetation treatments occur, but are short-term in duration and limited to specific locations within the planning area. None of these actions substantially alters the opportunities for, or distribution of, recreational activities within the planning area.

Under Alternative A, the established protection measures benefit recreation because of the direct link between recreational use (fishing, hunting, wildlife viewing, and photography) related to these resources. Under Alternative A, nonresident recreational visitation is anticipated to increase annually in the short term for dispersed recreation (Betz et al. 1999).

Alternative B

Recreation Management

Surface-disturbing Activities. Under Alternative B, the projected long-term surface disturbance from BLM actions results in the lowest disturbance acreage of all alternatives (refer to Table 4-1). These management actions could result in direct and indirect adverse impacts to recreational resources, as conflicts between recreational use and development may occur in all disturbed (commercially developed) areas. The quality of dispersed recreation will diminish over time in areas where large-scale development occurs. Potential adverse impacts to recreation resources from surface-disturbing activities under Alternative B are less than those identified under Alternative A.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative B are beneficial and similar in type to all other alternatives. Alternative B closes and withdraws more acreage to mineral resources than all other alternatives, resulting in the greatest beneficial impact to recreation of all the alternatives.

Special Recreation Management Areas

Under Alternative B, four SRMAs are identified (Table 4-12) and the remaining planning area is identified as an ERMA. Identifying SRMAs and the ERMA are anticipated to benefit recreation more than Alternative A. The Dempsey Ridge SRMA provides more protection for recreational resources compared to Alternative A because it does not authorize mineral material sales or free use permits and pursues mineral withdrawals. Alternative B also provides for the least amount of forest-management activities in Dempsey Ridge and, accordingly, poses the least potential to adversely affect recreational uses due to vegetation treatments.

The proposal for the Pine Creek Canyon, Raymond Mountain, and Oregon-California National Historic Trail to move to SRMA status provides additional protection to their recreational opportunities. The recreational settings are enhanced through the long term. The quality of recreational experiences improves, and benefits from recreational activities increase.

Recreational Use

Other Resource Management Actions. Under Alternative B, management actions concerning vegetation, water, soil, livestock grazing, and fire enhance fish and certain desirable wildlife habitats throughout the planning area and preserve the landscape aesthetics for recreation to a greater extent than under Alternative A.

The increased restrictions further protect resources of interest to the recreating public compared to Alternative A. For example, because forestlands are managed for watershed stability, wildlife habitats, and recreational considerations, beneficial long-term impacts to recreation are anticipated under Alternative B. Under Alternative B, nonresident recreational visitation increases annually in the short term for dispersed recreation (Betz et al. 1999).

Alternative C

Recreation Management

Surface-disturbing Activities. Under Alternative C, the projected long-term surface disturbance from BLM actions is anticipated to be similar to, but less than, Alternative A (refer to Table 4-1). These actions result in direct and indirect adverse impacts to recreational resources as conflicts between recreational use and other resource development occurs. The quality of dispersed recreational experience opportunities diminish over time in areas where intensive development occurs. Potential adverse impacts to recreation resources from surface-disturbing activities under Alternative C are similar to, but less than, those identified under Alternative A.

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative C are beneficial and similar in type to all other alternatives. Alternative C removes or closes little or no acreage to mineral development, resulting in the least beneficial impact to recreation of all alternatives, similar to Alternative A.

Special Recreation Management Areas

Under Alternative C, four SRMAs are proposed and the remaining planning area is identified as an ERMA. The projected impacts to recreation in these areas are anticipated to be similar as those impacts discussed under Alternative B.

While SRMAs may incorporate management actions to enhance and protect recreational values, they do not preclude development of other, often competing resources. Since Alternative C emphasizes resource use over resource conservation, it can be expected that recreation uses will be in more direct competition with other resource use opportunities. Proactive recreation management actions under Alternative C, while beneficial, are more beneficial than Alternative A, but less beneficial than all other alternatives.

Recreational Use

Other Resource Management Actions. Management actions and related impacts under Alternative C are similar to those described for Alternative A with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources, but are less restrictive. The lesser restrictions are not expected to impact recreational use patterns to a substantial degree. In addition, visual resources are managed according to the 2004 inventory, which more accurately categorizes the visual resources of the planning area and provides for more suitable management of the resource compared to Alternative A. Visual resources of interest are better protected compared to Alternative A, providing for long-term protection of key aesthetic resources.

While seasonal motorized vehicle restrictions in crucial big game areas are not carried forward under Alternative C, all other wildlife management actions afford the least protection to wildlife resources compared to other alternatives. Alternative C has the greatest potential for degrading the wildlife resource, which could adversely impact recreational users relying on wildlife resources. At the same time, relaxation of protective measures provide minor benefits to recreational users seeking a more rural and (or) motorized recreational experience, since this alternative affords the least restriction to access. However, this alternative could have an adverse impact on the quality of the recreational experience.

Alternative C has the greatest potential for access and road infrastructure acquisition; however, it also has the most potential to displace recreational users and diminish the quality of recreational experiences throughout the planning area, including areas known to have sensitive resource values. Under Alternative C, nonresident recreational visitation increases annually in the short term for other dispersed recreation under this alternative (Betz et al. 1999).

Alternative D (Proposed RMP)

Recreation Management

Surface-disturbing Activities. Under Alternative D, the projected long-term surface disturbance from BLM actions is less compared to Alternative A (refer to Table 4-1). These management actions could result in direct and indirect adverse impacts to recreational resources, as conflicts between recreational use and development may occur in disturbed (commercially developed) areas. The quality of dispersed recreation diminishes over time in areas where large-scale development occurs. Potential adverse impacts to recreational resources from surface-disturbing activities under Alternative D are less than those identified in Alternative A (Appendix M).

Withdrawals and Closures to Mineral Resources. The impacts to recreation from closures and withdrawals under Alternative D are beneficial and similar in type to all other alternatives. Alternative D is more beneficial to recreation than alternatives A and C, but less beneficial than Alternative B.

Special Recreation Management Areas

Under Alternative D, four SRMAs are identified and the remaining planning area is identified as an ERMA. Identifying SRMAs and the ERMA are anticipated to benefit recreation more than Alternative A.

Recreational Use

Other Resource Management Actions. Management actions and related impacts under Alternative D proactively identify and pursue opportunities to acquire public access to areas with high recreational use value within the planning area to increase recreational opportunities for the public. Projected impacts to recreation under Alternative D are similar to those described for Alternative B.

Management actions and related impacts under Alternative D are similar to those described for Alternative B with regard to impacts from vegetation, fire, cultural, paleontological, and livestock resources. Visual resources are managed according to the updated visual inventory, which manages the current visual resource conditions and more accurately provides for the protection of key aesthetic values impacting the quality of recreational experiences.

Fewer adverse impacts on recreational users are expected due to the minor changes in protective actions to fish and wildlife habitats under Alternative D. Beneficial impacts will be greater and the adverse impacts less under Alternative D than under Alternative A.

Nonresident recreational visitation increases annually in the short term for other dispersed recreation under this alternative (Betz et al. 1999).

4.6.5.3 Conclusion

Allowable uses and management actions described in this section for the various alternatives were used to forecast impacts to recreational resources. Meaningful differences in surface disturbance, areas closed or withdrawn from mineral development, identification of SRMAs, proactive recreation management actions, and other resource management actions form the basis for the following conclusion: impacts to recreation resources from the alternatives are anticipated to be similar in type, but different in intensity.

Although none of the alternatives is expected to impact recreational use, distribution, or experience opportunities substantially, Alternative B enhances the recreational experience of users expecting a more primitive recreational experience more than any of the other alternatives by limiting development to the greatest extent. Alternative B provides the greatest protection for wildlife resources, providing long-term benefits to hunters. The SRMAs proposed under alternatives B, C, and D provide more recreational

opportunities compared to Alternative A. Alternative C provides more access, which benefits some recreational users, but also allows for the greatest amount of development. More development adversely impacts recreational users, especially those seeking recreational experiences in more natural settings or experiences dependent on significant fish and wildlife populations.

In general, displacement of dispersed recreational use tends to be localized and results from management activities related to competing resource-development activities. Long-term displacement occurs where concentrated large-scale development is located. Such development could reduce the quality of the recreational experience and displace recreational users over time, but will be spatially limited. Management actions directed at improving recreational opportunities enhance both primitive and developed recreational experiences.

Alternative D provides more balanced recreational experience opportunities for both natural and modified settings as compared to alternatives A and C. Alternative D provides the most flexibility for management to enhance the recreational experience of those users wanting a more developed (rural) recreational experience, as well as more natural settings for recreational activities.

4.6.6 Travel Management

The following section describes the impacts of each alternative on travel management in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to travel management. Direct impacts to travel management include actions that add, close, or limit road use in the planning area.

4.6.6.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- The travel network (i.e., highways, railways, airports) within the planning area is essentially complete and no major travel infrastructure facilities are anticipated. Developing new roads for recreational access will be limited.
- Additional roads will be developed, as needed, to support expanded oil and gas operations in compliance with the multiple use concepts within FLPMA; the travel management program may adopt some of these roads for specific uses, such as recreational access.
- Use of roads will increase based on anticipated increases in oil and gas activity.
- Road design and construction considers other resource programs to minimize impacts.
- Users generally follow rules and regulations for motorized vehicle use; however, some users do not follow rules and unauthorized travel and OHV use in closed areas impact vegetation, soils, water, wildlife, etc.
- The greater the area of authorized roads open to motorized vehicles, the greater the benefit to travel management.
- Permanent or temporary closures of roads deemed unauthorized or that create unwanted resource concerns also are considered beneficial to the travel management program.
- Travel management planning generally improves travel management by limiting new roads to only those that are needed and increasing the efficiency of the roadway network by directing travel to preferred routes (e.g., utilizing roads that provide the shortest distance between two points, limiting travel on roads designated for specific purposes, etc.).
- Travel management plans will be developed under full public involvement.

- Reductions to road density result in beneficial impacts to some resources (e.g., big game, soils), but may require additional effort for users (e.g., longer travel routes).
- Disposal of mineral materials from BLM lands will continue to be needed to support road construction and maintenance.

4.6.6.2 Analysis of Alternatives

Allowable uses and management actions that could impact travel management primarily include mineral development, access, and fish and wildlife resources. As travel management is impacted by the alternatives, travel management can, in turn, impact other resources. The impacts of travel management on other resource topics (i.e., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The alternatives allow varying amounts of new development directly and indirectly, which will be expected to meet the demand for recreational access. Each of the alternatives includes an increase in the level of travel management planning to improve travel management within the planning area. Temporary road closures due to health and safety risks and (or) resource damage, and reclaiming roads and two-track routes determined to be unauthorized or redundant and unnecessary for resource management are considered beneficial to travel management because they reduce management efforts for these roads. However, certain resource management actions could adversely impact the travel management program by placing substantial limitations on the development of travel management or limiting existing access to portions of the planning area for desired multiple uses.

The resource management actions that could affect travel management include those that protect cultural resources, fish and wildlife, paleontological resources, soils, special status species, riparian and wetland communities, VRM, water resources, recreation, OHV, and each of the special designations. The increased level of development associated with oil and gas and other minerals will modify the road network, which will provide additional access through the planning area. These access developments will provide opportunities for recreation, particularly OHV use and dispersed recreational activities. Management of new roads requires routine and emergency maintenance of these roads. Other resource considerations (e.g., cultural resources, special status species) may constrain routing alternatives, require that other routing alternatives be adopted, increase acquisition costs, or determine that access acquisition will not be feasible. The Kemmerer Field Office continues to manage approximately 23 miles of existing snowmobile trails in the planning area.

Alternative A

Alternative A results in the long-term addition of approximately 932 miles of new roads within the planning area, primarily due to oil and gas development. These new roads are considered a beneficial impact to the travel management program.

Alternative A introduces minimal limitations to the use of existing roads within the planning area, as only existing limitations are carried forward. Seasonal closures for big game are limited to Slate Creek, Dempsey Creek, and Bridger Creek crucial winter ranges from January 1 to April 30. Existing roads and trails are open for use, with travel management planning limited to oil and gas field-development plans. Under this alternative there are no objectives for open road density and no specific measures to protect special status plants species. Ongoing issues, such as unauthorized use of roads constructed for oil and gas, livestock, and so on, that currently are not gated may persist, resulting in continued impacts on other resources. While Alternative A presents few constraints to existing and future roads, it also includes few

measures to improve travel management within the planning area through the incorporation of travel management plans.

Alternative A seeks to gain legal access to areas that will be intensively managed for timber production, as well as to obtain temporary easements for specific actions. In addition, access is to be acquired for the following high priority areas for land management: Raymond Mountain WSA, Dempsey Basin, Commissary Ridge, and the Bear River Divide area.

Alternative B

Alternative B includes the lowest amount of new roads at 873 miles, primarily due to oil and gas development, of the four alternatives. However, this is only about 6-percent less than under the other alternatives.

Alternative B introduces additional limitations to the use of existing roads, as well as the construction of additional roads by designating the entire planning area as open, closed, or limited. Increased seasonal closures include closing all big game crucial winter ranges to motor vehicle use from November 15 to April 30. Travel management planning is required within big game winter ranges to minimize open road density such that an average of ½ mile of open road per square mile is not exceeded. BLM could accomplish this by only allowing certain roads or portions of roads in winter ranges to be maintained for access during the winter, or by temporarily (seasonally) closing certain roads or portions of roads during the winter. Although the level of open roads may exceed this objective now, the BLM could reduce the overall open roads density through travel management planning. This restriction would primarily impact the oil and gas industry and other members of the public that are exempt from the access restrictions into big game crucial winter habitat. Additional small scale travel management plans outside of identified priority areas can be accomplished on a case-by-case basis as funds become available. Alternative B includes development of a scenic Back Country Byway from Kemmerer over Dempsey Ridge to Fossil Butte and back to Kemmerer. Alternative B includes the most constraints to motor vehicle travel on roads within the planning area, while also increasing the level of travel management planning, thereby improving travel management more than Alternative A. Legal access, easements, and access acquisition are the same as described under Alternative A.

Alternative C

Alternative C results in the long-term addition of approximately 932 miles of new roads (same as under Alternative A), primarily due to oil and gas development.

Travel management planning under Alternative C will be similar to that described under Alternative B, including additional small scale travel management plans accomplished on a case-by-case basis as funds become available. Conversely, Alternative C reduces limitations to motorized vehicle travel by eliminating existing seasonal restrictions (i.e., closure of big game crucial winter ranges, etc.). Therefore, it will reduce constraints on vehicle travel and provide limited improvements to travel management.

Alternative C seeks to gain legal access across private land in support of resource programs benefiting travel management. In addition, access is to be acquired for the following high priority areas for land management: Redeye Basin, Commissary Ridge, Raymond Mountain WSA, Dempsey Basin, Slate Creek, Rock Creek area, Little Muddy Creek, Meeks Cabin, Westfork, Graham Reservoir, Church Buttes, Wildcat Butte, Porter Hollow, Lincoln Highway, and the Bridger Antelope Trap.

Alternative D (Proposed RMP)

Alternative D results in the long-term addition of approximately 932 miles of new roads (same as under Alternative A) primarily due to oil and gas development.

Travel management under Alternative D will be similar to that described under Alternative B, with a few exceptions that are less constraining toward motor vehicle travel. Seasonal road closures occur only in identified crucial winter ranges and are shorter than under Alternative B and similar to those under Alternative A (January 1 to April 30), road density in big game winter range is limited to 2 miles per square mile, and measures to protect special plant status species are less stringent. As under Alternative B, the road density limitation may be met by only allowing certain roads or portions of roads in big game crucial winter ranges to be maintained for access during the winter, or by temporarily (seasonally) closing certain roads or portions of roads during the winter. Travel management planning includes a larger portion of the planning area than under alternatives A and C, but less than under Alternative B. As under alternatives B and C, additional small scale travel management plans can be accomplished on a case-by-case basis as funds become available.

4.6.6.3 Conclusion

Alternatives A, C, and D result in the addition of 932 miles of new roads within the planning area, while Alternative B adds 873 miles. Alternative C provides the least number of constraints to travel management in favor of resource protection, although it also includes the lowest level of planning to improve travel in the planning area. Alternative A is similar to Alternative C, but with somewhat higher constraints for resource protection. Alternative B provides a high level of constraints to travel management in favor of resource protection, but also includes a high level of travel management planning to improve the efficiency of the planning area road network. Alternative D is similar to Alternative B, but is somewhat less constraining in regard to resource protection and includes a lower level of travel management planning.

4.6.7 Off-Highway Vehicles

The following section describes the impacts of each alternative on OHV use and management, including snowmobiles, in terms of direct, indirect, and short- and long-term impacts. As appropriate, impacts are described as beneficial or adverse with respect to OHV use and management in the planning area. Direct impacts to OHV use include designation of lands within the planning area as open, designated, seasonally closed, and closed to OHV use. Restrictions to protect resource values (e.g., cultural) also are considered direct impacts to OHV use. Indirect impacts to OHV use include management actions affecting access to public lands within the planning area. For example, authorized energy development in the planning area may require development of roads, which can then be used for OHV use. Refer to maps 46 through 53 for OHV and snowmobile use and management.

4.6.7.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- OHV use is motor vehicle use of the nonhighway road and trail network on public lands. It includes all resource-related activities, including recreation and those associated with livestock grazing and mineral development.
- OHV use will increase at a faster pace than the rate of population growth because of the increasing popularity of off-road travel, improvements to OHV technology, and intensity of development and use of public lands.

- Recreational OHV use is highest within large blocks of public land with legal access and with special resource values, such as those associated with hunting and fishing.
- If adequate infrastructure exists and is maintained, the majority of recreational OHV users choose routes that minimize environmental degradation.
- The analysis assumes OHV designations are to be fully implemented 5 years after approval of this RMP.
- Rules and regulations for motorized vehicle use generally are followed by users; however, some users do not follow rules, and unauthorized travel and OHV use in closed areas impact vegetation, soils, water, wildlife, etc.
- The seasonal closure would not apply to tasks performed in support of a permit or authorization issued by the BLM. In addition, other government entities that require entry to perform tasks related to management, maintenance, and control of wildlife would be exempt from the seasonal closure rule.

4.6.7.2 Analysis of Alternatives

Impacts to OHV use from alternatives generally will occur under all alternatives. As the alternatives impact OHV use, OHV use, in turn, impacts other resources and resource uses. For example, alternatives that restrict OHV use in sensitive areas are intended to protect resource values (e.g., wildlife and cultural) in those areas. While these restrictions are considered an adverse impact to OHV use, they benefit the resource values they are designed to protect. The impacts of these restrictions on OHV use are described in this section. The impacts of OHV use on other resources and resource uses are described in the appropriate impacted resources in this chapter.

Impacts Common to All Alternatives

The types of impacts projected to occur to OHV use because of the various alternatives are similar. However, the intensity of impacts is anticipated to vary by alternative; therefore, impacts to OHV use are described under individual alternatives. All alternatives may designate areas within the planning area as open, designated, seasonally closed, or closed. The greater the acreages open to OHV use, the greater the beneficial impact to this resource use. The greater the area closed (permanently or seasonally) to OHV use, the greater the adverse impact to this resource use.

Impacts from the "Open" Designation. This designation is beneficial to users of OHVs, all-terrain vehicles, motorcycles, and other off-road vehicles because it provides an appropriate, managed location for a type of OHV recreation considered inappropriate in other areas. Open designations often allow unmanaged road proliferation, damage to or loss of vegetation, soil erosion, degradation of the visual quality of the landscape, and adverse effects on cultural resources adjacent to open areas. Such designations are often in direct conflict with other resource values, such as wildlife habitats and scenic quality.

Impacts from the "Designated" Designation. Under this designation, the incremental growth of unauthorized user-created roads and trails is curtailed, as would be unauthorized OHV use. OHV use is limited to a specific designated network of roads and trails. Such a limitation is beneficial to soils and limit the spread of INNS, but has no impact on commercial or industrial uses of public lands because roads necessary to facilitate those uses are handled under permits or authorizations. This designation does not affect public access, nor does it diminish OHV opportunities. Further, it has no impact on other resource uses, such as mineral development, because under such a designation, access roads are authorized as needed.

Impacts from the "Seasonally Closed" Designation. Under this designation, specific portions of the planning area (e.g., big game crucial winter range) are closed during specific timeframes. This designation is a direct adverse impact on OHV use, but less adverse than the closed designation because the areas are open during other times of year.

Impacts from the "Closed" Designation. This designation adversely impacts OHV use by eliminating motor vehicle access in these areas and limiting access to nonmotorized means (e.g., foot or horseback). Closed designations adversely affect uses requiring road access, such as minerals when there is a need for road access in closed areas to develop the minerals. However, no alternative proposes more than 3 percent of BLM-administered surface to be closed, so the impact is relatively minor.

Designations for snowmobile use include designated, limited, and closed areas in the planning area. Similar to OHV designations, areas designated as closed to snowmobiles are direct adverse impacts to snowmobile use. The greater the acreage closed to snowmobile use, the greater the adverse impact to this resource use. The greater the acreage open to snowmobile use, the greater the beneficial impact to this resource use. Areas limited to snowmobile use are seasonal limitations as defined in the alternatives (see Table 2-3). All alternatives designate 22.5 miles of snowmobile trails in the planning area, benefiting this resource use.

Alternative A

Alternative A continues the current OHV use designations, including approximately 287,160 acres (20% of BLM-administered surface) seasonally closed and approximately 32,787 acres (2% of BLM-administered surface) closed to OHV use. These closures are direct adverse impacts to OHV use in the planning area. However, under Alternative A, limited off-trail travel is allowed for dispersed use and to perform necessary tasks, benefiting OHV users in the planning area. No areas in the planning area are identified as open under Alternative A.

Alternative A closes the least acreage (26,115 acres) to snowmobile use of all alternatives and designates approximately 291,653 acres of BLM-administered surface as limited. The acreage designated as limited snowmobile use is the second highest of all alternatives. Raymond Basin is open for snowmobile use. Alternative A considers new snowmobile trails on a case-by-case basis, benefiting this resource use. These designations result in both beneficial and adverse impacts to snowmobile use.

Alternative B

Alternative B closes 33,896 acres of BLM-administered surface to OHV use, the greatest acreage of all alternatives. This includes the Raymond Mountain WSA and other areas identified in Table 2-3, adversely impacting OHV use in the planning area. However, the total area closed is still less than 3 percent of the BLM-administered surface. Alternative B also seasonally closes the largest area (599,175 acres) to OHV use in the planning area, resulting in the greatest adverse impact to OHV use of all alternatives. Alternative B does not allow off-trail OHV travel in the planning area, adversely impacting OHV users in the planning area.

Alternative B closes the greatest acreage (32,802 acres) to snowmobile use and designates the greatest acreage (569,609 acres) as limited of all alternatives in the planning area, resulting in greater adverse impacts to snowmobile use than Alternative A. Alternative B does not allow new snowmobile trails to be developed in big game crucial winter range, adversely impacting snowmobile use in the planning area.

Alternative C

Alternative C closes the same acreage to OHV use as Alternative A, resulting in the same impacts to OHV use as Alternative A. No seasonal closures to OHV use are implemented under Alternative C, resulting in greater beneficial impacts to OHV use than Alternative A and the other alternatives. In addition, Alternative C opens approximately 2,791 acres to OHV use on BLM-administered surface. In addition to allowing off-trail travel as identified under Alternative A, Alternative C allows this type of travel (up to ½ mile off existing roads and trails) to perform necessary tasks, benefiting OHV use in the planning area. Alternative C has the greater beneficial impacts to OHV use than Alternative A, but has the greatest potential for user conflicts.

Alternative C closes the same acreage to snowmobile use as Alternative A, resulting in the same impacts as Alternative A. No areas are designated as limited for snowmobile use under Alternative C, benefiting snowmobile use in the planning area. New snowmobile trails are considered on a case-by-case basis as under Alternative A.

Alternative D (Proposed RMP)

Alternative D closes the second greatest acreage (33,037 acres) to OHV use on BLM-administered surface; however, this acreage is less than 3 percent of BLM-administered surface so relatively minor impacts are anticipated. Alternative D seasonally closes the same acreage as Alternative A, resulting in similar impacts as Alternative A. In addition, approximately 4,506 acres are considered designated in the planning area and approximately 159 acres are open to OHV use in the planning area. Alternative D allows off-trail travel similar to Alternative A, but also allows greater distances of off-trail travel with a letter of authorization. Alternative D is anticipated to have beneficial impacts to OHV use similar to, but greater than, Alternative A.

Alternative D closes the same acreage to snowmobile use as Alternative B and identifies 258,851 acres as limited for snowmobile, the second lowest acreage use of all alternatives. New snowmobile trails are considered on a case-by-case basis as under Alternative A. Alternative D is anticipated to result in adverse impacts similar to, but less than, Alternative A.

4.6.7.3 Conclusion

Alternative B implements the most restrictions to OHV use of all alternatives and substantively changes OHV use designations compared to Alternative A. Alternative C implements the least restrictions to OHV use of all alternatives. Alternative A is similar to Alternative C; however, Alternative A implements more restrictions to OHV use than Alternative C. Alternative D has more restrictions than Alternative A, but it allows for better management of OHV use by opening and designating more areas for OHV use. Alternative D has the least potential for user conflicts.

4.6.8 Visual Resources Management

This section describes the anticipated impacts of each alternative on VRM in terms of direct, indirect, short-term, and long-term impacts. As appropriate, impacts also are described as beneficial or adverse with respect to visual resources.

Anything that draws the viewer's attention and contrasts with the basic elements (form, line, color, or texture) of a given landscape, impacts the viewer's perceptions, creating impacts to the visual resources. Changes from any source that introduce intrusive elements into the existing landscape could impact visual resources. Direct impacts resulting from on-the-ground activities may be either adverse or beneficial. Adverse impacts include the addition of visual intrusions, such as roads and facilities, or the removal of natural materials (i.e., soil, vegetation). Beneficial impacts are normally a direct result of post-

disturbance reclamation efforts. Indirect impacts relate to the management of other resource values, in which specific actions may limit, as well as increase, the effectiveness of the VRM program. Actions that occur on lands not administered by the BLM (regardless of ownership) can impact the visual resources of the adjacent public lands. Refer to maps 54 through 60 for visual resource management.

4.6.8.1 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Future development and other land use activities described under each alternative are compared to recommended VRM classes, the existing visual conditions, and degree of measurable contrast to determine potential impacts.
- To adequately describe potential impacts of each alternative in the context of the capacity for differing landscapes to absorb visual intrusions, actions potentially impacting visual resources were divided into general categories: high-profile developments, low-profile or short-term projects, and resource management prescriptions. Impact analysis considered changes within a ten-mile buffer.
- VRM classes will not extend across Reclamation lands.
- A contrast rating evaluation will be conducted for all surface disturbing activities within VRM Management Class I, II and III areas disclosing visual impacts. Visual impacts that do not meet VRM Class objectives will require mitigation in accordance with the VRM objectives. Contrast ratings will not be conducted for activities within VRM Class IV areas, but will still require visual mitigation to minimize visual impacts.

4.6.8.2 Analysis of Alternatives

Allowable uses and management actions that could impact visual resources primarily include surface development and fire and vegetation management. As visual resources are impacted by the alternatives, VRM can, in turn, impact other resources. The impacts of VRM on other resource topics (i.e., physical, biological, etc.) are discussed under the appropriate impacted resources.

Impacts Common to All Alternatives

The types of impacts projected to occur to visual resources because of the various alternatives are similar. However, the intensity of impacts is anticipated to vary by alternative; therefore, impacts to visual resources are described under individual alternatives.

Identified impacts to visual resources must be mitigated for a project to proceed. Projects where impacts could not be mitigated would not be authorized without further NEPA analysis. The intent of surface disturbance mitigation guidelines (see Appendix N) is to inform interested parties that when certain conditions exist, surface-disturbing activities will be prohibited unless an acceptable mitigation plan is developed. This negotiation will occur prior to development. Specific criteria (e.g., 500 feet from water) have been established based upon the best information available. However, such items as geographical areas and seasons must be delineated at the field level. Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

Activities that are large in scale relative to the landscape in which they occur create dominant long-term adverse visual impacts. Even when such activities meet the established VRM objectives, their impacts should be mitigated, where possible. Small-scale, dispersed development (e.g., range improvements) will have a lesser impact due to the ability to fit these improvements into natural landscapes. Visual resources

in areas with a high potential for oil and gas development are likely to be more heavily impacted through the long term.

Short-term impacts associated with forest management include changes in the natural line, color, form, and texture of harvest areas, as well as the introduction of new visual intrusions, such as haul roads. These impacts are anticipated to adversely impact visual quality; however, long-term impacts diminish as forests regenerate and may constitute an eventual beneficial impact to visual resources.

Alternative A

Visual Resource Management. Under Alternative A, management of VRM will continue according to the 1986 VRM maps. No specific prescriptions are identified under Alternative A to protect the viewshed of the Bridger Antelope Trap; however, all historical, archeological, and cultural sites eligible for or listed on the NHRP are protected or mitigated. The current restrictions for visual intrusion within 1,320 feet from either side of a historic trail or within the visual horizon of the trail will continue. These proactive VRM actions result in a beneficial impact to visual resources.

Surface-disturbing Activities. Current management allows for large-scale disturbances, high-profile intrusions, and concentrated development. As a result, high-profile and concentrated development of nonrenewable resources is expected to continue. Under Alternative A, surface-disturbing activities by resources identified in Appendix M could impact visual resources. Under Alternative A, the projected short-term and long-term surface disturbance from BLM actions results in the highest disturbance acreage of all the alternatives (refer to Table 4-1). The intensity of impacts to visual resources is expected to be primarily adverse.

Restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, cultural resources, and special designations) under Alternative A provide additional protection for visual resources. This and other management actions of this type result in beneficial impacts to visual resources because they limit the potential for disturbance. However, fewer restrictions on surface-disturbing activities are provided under Alternative A than under alternatives B, C, and D. Therefore, additional protection for visual resources under Alternative A is less than all other alternatives.

No defined current management exists for wind-energy development. As such, wind-energy development, such as the placement of turbines and ancillary structures, could result in an adverse impact to visual resources.

Vegetation Management. Vegetation management under Alternative A is applied to varying plant communities in a limited fashion. The use of prescribed fire and wildland fire suppression could create adverse impacts to visual resources. Fuel-reduction methods, such as mechanical, chemical, or biological vegetation treatments and the use of mosaic burn patterns, minimize impacts to visual resources.

Under Alternative A, adverse impacts to visual resources resulting from mechanical, chemical, or biological vegetation treatments are anticipated to be short-term. Long-term impacts from vegetation treatments will most likely be beneficial to visual resources.

Alternative B

Visual Resource Management. Visual resource impacts for this alternative will be evaluated based on the visual contrast of proposed projects from the key observation points provided in the Glossary (see Key Observation Point). Map 66 identifies key observation points in the planning area. Under Alternative B, the Raymond Mountain WSA would be managed as VRM Class I (see Glossary). Class II visual resources around all sensitive roads, NHTs, campgrounds, towns, and NRHP-listed resources will receive

a protective 3-mile buffer. Class III visual resources will include areas of high human disturbance and low visual stimulation (including boundaries of the Pine Creek Ski Area and Lion's Club Park R&PP leases), and Class IV will include the remaining acreage of the planning area. Alternative B also preserves the viewshed within 10 miles of the Bridger Antelope Trap, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, Bear River Divide trail landmark, and Gateway petroglyphs where the visual characteristics of the setting contribute to the eligibility of the site. Management objectives include retaining the existing character of the landscape in federal sections so developments do not dominate the visible area or detract from the feeling or sense of the historic time period of the site. The viewsheds of NHT segments are preserved for 10 miles for Class 1 segments, 5 miles for Class 2 segments, and ½ mile for Class 3 segments under Alternative B. Given these VRM prescriptions, Alternative B provides more protection to visual resources than all other alternatives. These proactive management actions result in a beneficial impact to visual resources.

Surface-disturbing Activities. The impacts to visual resources from surface-disturbing activities under Alternative B are anticipated to be less than under all other alternatives. Under Alternative B, the projected short-term and long-term disturbance acreages from BLM actions are the lowest of any alternative (refer to Table 4-1). Relative to current management, large-scale disturbances, visual intrusions, and concentrated development are limited under Alternative B. In addition, additional restrictions on surface-disturbing activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) provided additional protection for visual resources under Alternative B. For example, under Alternative B, wind-energy development is prohibited in areas of high resource values. As such, wind-energy development does not pose an adverse impact on visual resources. Alternative B is anticipated to have the greatest beneficial impacts or visual resources.

Vegetation Management. Vegetation management prescriptions under Alternative B promote age and species diversity among differing plant communities, with an emphasis on mountain shrub, sagebrush, and forest communities. Large, contiguous blocks of vegetation communities will be managed to maintain and increase old growth conditions and adopt connectivity wherever possible. The long-term impacts to visual resources from management activities are anticipated to be beneficial. In addition, 3,000 acres of combined forestland and woodland in the Raymond Mountain WSA will be managed by prescribed fire to stimulate the natural alteration of vegetation. Soil disturbances related to fire suppression are not allowed without consent from the authorized officer. Although such impacts, should they occur, will represent an adverse impact, they will likely be short-term.

Overall, Alternative B affords more protection to visual resources and results in fewer adverse impacts to visual resources than all other alternatives. In addition, Alternative B considers existing conditions throughout the planning area and, therefore, increases the potential to achieve visual resource goals.

Alternative C

Visual Resource Management. As under Alternative B, visual resource impacts for this alternative will be evaluated based on the visual contrast of proposed projects from the key observation points provided in the Glossary (see Key Observation Point). Map 66 identifies key observation points in the planning area. With the exception of the Raymond Mountain WSA, which will be managed as a VRM Class I, Alternative C will continue to manage visual resources according to the 1986 VRM maps. No other specific prescriptions are identified under Alternative C to protect the viewshed of particular visual resources, such as the Bridger Antelope Trap or NHT segments. However, current restrictions for visual intrusion within 1,320 feet from either side of a historic trail or within the visual horizon of the trail will continue. As such, Alternative C will be slightly more protective of visual resources than Alternative A, but less protective than alternatives B and D.

Surface-disturbing Activities. The impacts to visual resources from surface-disturbing activities under Alternative C are anticipated to be adverse and similar in type to Alternative A (as identified in Appendix M). However, the intensity of adverse impacts to visual resources from surface-disturbing activities under Alternative C is anticipated to be less than under Alternative A. Under Alternative C, the projected short-term and long-term disturbance acreages from BLM actions result in the second highest disturbance acreage of all the alternatives (refer to Table 4-1).

Fewer restrictions on surface-development activities for the protection of other resources (e.g., soil, water, biological resources, and special designations) are provided under Alternative C than under alternatives B and D; therefore, additional protection for visual resources under Alternative C is less than alternatives B and D. For example, under Alternative C, wind-energy development is allowed with some restrictions, except in the Raymond Mountain WSA and the Bridger Antelope Trap. Alternative C is slightly more protective of visual resources than Alternative A, but less protective than alternatives B and D.

Vegetation Management. Vegetation management under Alternative C is similar to the description under Alternative B, but realized on a smaller scale, as the area managed is smaller. The management to limit habitat fragmentation still represents a beneficial impact to VRM compared to Alternative A. Soil disturbances related to fire suppression will be allowed only with the consent of the BLM authorized officer. As such, visual impacts resulting from both wildland and prescription fires are expected to be slightly less than those under Alternative A. Overall, Alternative C affords more protection to visual resources and results in less adverse impacts to visual resources relative to Alternative A.

Alternative D (Proposed RMP)

Visual Resource Management. Visual resource impacts for this alternative will be evaluated based on the visual contrast of proposed projects from the key observation points provided in the Glossary (see Key Observation Point). Map 66 identifies key observation points in the planning area. Similar to alternatives B and C, the Raymond Mountain WSA will be managed as a VRM Class I under Alternative D.

A visual corridor extending up to 1 mile will be created for Class II visual resources, such as the Sublette Cutoff, the Slate Creek Cutoff, and portions of the Oregon/California Trail, and part of the Mormon--California-Pony Express Trail south of I-80 and east of Bigelow Bench. Other visual resources managed as VRM Class II include the Star Valley area, and the northwest portion of the planning area from a line beginning at the public land at the base of Slate Creek Ridge (T23N, R115W Sections 17 and 20) and extending in a westward direction following the east-west drainage that exists near the centerline of Section 20, T23N, R115W; then west through the north half of Section 19, T23N, R115W to Section 24, T23N, R116W; then along the public/ private land boundary to Willow Creek in the south half of Section 24, T23N, R116W; then following Willow Creek northwest to Fisher Creek and continuing northwest along Fisher Creek to the intersection with the Pomeroy Basin Road; then south along the Pomeroy Basin Road to the Muddy Creek stream segment running north/south through Section 35, T23N, R116W; then south along Muddy Creek to the segment of Carl Creek running east/west in Section 2, T22N, R116W; then west along Carl Creek to the ridgeline in the SW corner of Section 38, T23N, R116W; then following the ridgeline southeast of Van Gilder Spring then west to the north/south ridgeline running through Sections 5, 8, and 18, T22N, R116W to SH 233 in consideration of NHTs, scenic roadways, and current high-quality scenery. Also, the portion of the planning area south and west of U.S. Highway 30 (the highway) beginning on a north-south line along the high ridgeline approximately ¼ mile west of the current active coal leases (west of the town of Kemmerer); south along the high ridgeline to the ridgeline behind the active coal leases in T21N, R117W, Section 25; then west following the high points of the topography approximately 3 miles south of the highway to T21N, R118W, Section 28; then north-west following the high points of the topography within approximately 3 miles of the highway to T21N, R118

W, Section 18; then north-west following the high points to within approximately ½ mile of the highway in T21N, R118W, Section 12; then west to the junction of U.S. Highway 30/State Highway 89. Class III resources include all areas not designated Class I, II, or IV, and will be managed as such. Class IV areas will be managed in consideration of higher energy development potential and include areas such as Boundary Ridge, checkerboard lands southeast of State Highway 189, and areas north and south of I-80, excluding the federal sections that contain the Bridger Antelope Trap and high value NHT segments.

Alternative D also preserves the viewshed within 3 miles of the Bridger Antelope Trap juniper fence, Emigrant Spring/Slate Creek, Emigrant Spring/Dempsey, Johnston Scout Rock, Alfred Corum and Nancy Hill emigrant gravesites, Pine Grove emigrant camp, Rocky Gap trail landmark, Bear River Divide trail landmark, and Gateway petroglyphs by designing ROW corridors to preserve the visual integrity of the sites consistent with the BLM visual resources handbook/manual. Other developments will be managed to maintain setting qualities and not to have an exclusion zone. Those areas within the planning area identified as VRM Class II were considered exclusion areas for ROWs and other resource uses for analysis purposes. However, under implementation of Alternative D, ROWs and other resource uses may be allowed in these areas as long as VRM class objectives are met (see Table 2-3).

In addition, Alternative D will preserve the viewshed within 3 miles of Class 1 NHT segments and other historic trail segments in the Tunp/Dempsey Trail area. Under Alternative D, the viewsheds of other NHT segments also are preserved for 1 mile for Class 1 segments, ½ mile for Class 2 segments, as well as Class 3 segments to existing VRM classes. However, these stipulations are specific to areas where the visual characteristics of the setting contribute to the eligibility of the site. These proactive management actions result in a beneficial impact to visual resources. As such, Alternative D provides more protections to visual resources than alternatives A and C, but is less protective than Alternative B.

Surface-disturbing Activities. Under Alternative D, the projected short-term and long-term disturbance acreage from BLM actions result in the third highest disturbance acreage (refer to Table 4-1). As a result, the intensity of adverse impacts to visual resources from surface-disturbing activities under Alternative D is anticipated to be less than under alternatives A and C.

Relative to current management, large-scale disturbances, visual intrusions, and concentrated development are expected to continue under Alternative D. For example, wind-energy development in the planning area is less restricted than under Alternative B.

Vegetation Management. Under Alternative D, the impacts of mechanical, chemical, and biological vegetation treatments are similar to those under Alternative B. Alternative D will manage large, contiguous blocks of vegetation communities to maintain old growth conditions and adopt connectivity wherever possible. Alternative D does not seek to increase the areas designated as old growth communities; however, the long-term impacts to visual resources from management activities are anticipated to be beneficial.

4.6.8.3 Conclusion

With much of the BLM-administered minerals and surface ownership located within VRM Class IV areas, there will be minimal restrictions on mineral development for protection of visual resources under all alternatives. Alternatives B and D are anticipated to limit the potential impact to visual resources. Under alternatives A and C, the direct impact to the visual setting associated with surface disturbance and facility development continues throughout the planning area and has the potential to impact areas highly valued by the public, such as cultural sites, historic trails, and recreational areas.

Overall, Alternative B, followed by Alternative D, produces the least adverse impacts to VRM because of restrictions imposed by management actions. In addition, Alternative B has the greatest potential for long-term beneficial impacts to visual resources through vegetation management that seeks to restore historic conditions and increases the designated acreage of old growth communities.

4.7 Special Designations

Lands within the planning area designated for their unique natural, historic, scenic, or recreational resources are referred to as special designations. Special designations include Areas of Critical Environmental Concern (ACECs), RNAs, Wild and Scenic Rivers (WSRs), WSAs, and Back Country Byways (BCBs). Lands established for other management for resource values or resource uses, but lacking a special designation, are Other Management Areas (MAs). An ACEC is a regulatory designation created in the FLPMA, and can be established only during the land use planning process. An MA, on the other hand, is a management decision and can be established at any time as long as the MA conforms to the current RMP and is warranted. Alternatives to current management propose specific lands as special designations and identify areas for other management within the planning area. Typically, special designations and MAs constrain some resource uses within their boundaries to conserve natural, historic, scenic, and recreational resource values; however, designations also can encourage other resource uses in particular areas (e.g., sightseeing, scientific study). Conversely, public use of special designations and MAs that are adjacent to private land could adversely impact the private land owners due to impacts such as increased erosion on trails or access routes, livestock/recreational user conflicts, and increased trash and other debris. The impacts on resources and resource uses of designating lands as special designations and establishing MAs in the planning area are described in this section.

4.7.1 Areas of Critical Environmental Concern, Other Management Areas, and Research Natural Areas

This section presents an analysis of management actions involving 12 proposed or existing special designations (10 ACECs and 2 RNAs) within the planning area (Table 4-13). In general, alternatives differ by whether they designate areas under special designations or not and how many. In addition, alternatives differ by the type of proposed special designation or whether the area is proposed as an MA. This section is organized in the same order of the special designation section in Chapter 3. The special designation analysis, unlike the other analyses in this chapter, considers the impacts of special designations or identification of other management on other resources and resource uses within the planning area rather than focuses on how alternatives impact a single resource program. This analysis is based on the following assumptions: (1) special designations are established and managed in a manner to protect specific resource values within their boundaries; therefore, resources not specifically protected may be impacted by these designations, and (2) analysis of the impacts to resources and resource uses from special designations and establishment of MAs is necessary to clarify management choices between alternatives.

The impact analysis considers impacts from the administrative action of designating lands or of identifying other management for lands within the planning area. In addition, the impact analysis considers implementing a management plan for each designation or MA. However, at this time, general assumptions are used because, with the exception of the Raymond Mountain ACEC and WSA, detailed management plans and implementation programs for specific areas are not available. Management actions associated with each alternative are the basis for the impact analyses that follow. Where appropriate, uncertainties (i.e., a lack of available data or incomplete information) are identified.

The following discussions are limited to important considerations and impact findings as compared with the existing conditions in the planning area. If a potential impact is (1) virtually identical for all alternatives, (2) inconsequential, or (3) otherwise minor relative to other issues, it is either noted for clarification or not mentioned. This approach to the analysis avoids presenting redundant and unnecessary discussions. In general, each analysis covers a selected set of environmental disciplines and generally presents the issues in order of importance.

Table 4-13. Proposed and Existing Special Designations and MAs by Alternative

Name	Alternative			
	A	B	C	D *(Proposed RMP)*
Existing ACEC				
Raymond Mountain	ACEC	ACEC	--	ACEC
Proposed ACECs/RNAs/MAs				
Raymond Mountain Expansion	--	ACEC	--	--
Special Status Plant Species Habitat	--	ACEC/RNA	--	ACEC/CBC
Cushion Plant Communities	--	ACEC/RNA	--	ACEC/CBC
Bridger Butte	--	ACEC	--	ACEC
White-tailed Prairie Dog Complexes	--	ACEC	--	--
Dry Fork Watershed	--	ACEC	--	--
Upper Tributary Watershed	--	ACEC	--	--
Lower Tributary Watershed	--	ACEC	--	--
Fossil Basin	--	ACEC/MA	--	--
Rock Creek/Tunp	--	MA	--	MA
Bear River Divide	--	MA	--	MA
Determined Suitable for Inclusion in the National WSR System				
Bear River	--	WSR	--	--
Blacks Fork River	--	WSR	--	--
Bridger Creek Unit	--	WSR	--	--
Coal Creek	--	WSR	--	--
Dempsey Creek	--	WSR	--	--
Emigrant Creek	--	WSR	--	--
Fontenelle Creek	--	WSR	--	--
Hams Fork	--	WSR	--	--
Huff Creek	--	WSR	--	WSR
Pine Creek Unit	--	WSR	--	--
Raymond Creek Unit	--	WSR	--	WSR
Slate Creek	--	WSR	--	--
Smiths Fork River	--	WSR	--	--
Proposed WSA				
Raymond Mountain (as proposed to Congress)	WSA	WSA	WSA	WSA
Raymond Mountain (If Congress does not designate it as wilderness)	--	WSA	--	WSA
Proposed Back Country Byway				
Emigrant Springs	--	BCB	--	--

-- No special designation under this alternative
ACEC Area of Critical Environmental Concern
BCB Back Country Byway
CBC Habitat would be designated on a case-by-case basis
RNA Research Natural Area
MA Management Area
WSA Wilderness Study Area
WSR Wild and Scenic River

Raymond Mountain ACEC

Maintaining and enhancing Bonneville cutthroat trout habitats is the primary objective of designating the 12,667-acre Raymond Mountain ACEC. The existing Raymond Mountain ACEC is managed in accordance with the *Raymond Mountain ACEC Management Plan* (BLM 1982).

4.7.1.1 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts associated with retaining or not retaining the Raymond Mountain ACEC designation and the proposed expansion of the ACEC vary by alternative, as described below.

Alternative A

The 12,667-acre Raymond Mountain ACEC is retained at its current size under Alternative A and managed in accordance with the *Raymond Mountain ACEC Management Plan* (BLM 1982) (see Map 61). There are no existing oil and gas leases in the Raymond Mountain ACEC; thus, constraints on oil and gas development are expected to have negligible adverse impact. The existing Raymond Mountain ACEC, which is located wholly within the Raymond Mountain WSA, is also withheld from mineral leasing. Likewise, the prohibition on coal development is expected to have a negligible adverse impact due to the low occurrence potential for coal within the Raymond Mountain ACEC. The prohibition on phosphate leasing within the Raymond Mountain ACEC will prevent extraction in the area classified as moderate phosphate occurrence potential. Trona leasing is also prohibited within the Raymond Mountain ACEC; however, the occurrence potential of trona in this area is low.

Management to protect the Bonneville cutthroat trout and its habitats within the Raymond Mountain ACEC is anticipated to continue under Alternative A. Avoidance of surface-disturbing activities and prohibition of motor vehicles within the ACEC protect soil from erosion, limit opportunities for the spread of INNS, and maintain or enhance water quality and riparian habitats. These constraints directly benefit Bonneville cutthroat trout habitats and indirectly benefit terrestrial wildlife and vegetation communities associated with riparian and aquatic habitats. Constraints on livestock grazing within the ACEC benefit the Bonneville cutthroat trout by conserving riparian vegetation and aquatic habitats; however, these constraints are considered adverse to livestock grazing because they reduce grazing opportunities in the area. Similarly, the prohibition of motor vehicle use in the ACEC protects natural resource values; however, this constraint adversely impacts OHV and snowmobile use because it restricts opportunities for users.

Alternative B

Under Alternative B, the existing Raymond Mountain ACEC is retained and expanded by 27,026 acres of BLM-administered surface (see Map 62). The proposed expansion will provide additional protection to the Bonneville cutthroat trout. Adverse and beneficial impacts to resources and resource uses described under Alternative A are expected to increase under Alternative B due to the expanded area subject to constraints; however, the types of impacts are not expected to vary. For example, the development and occurrence potential for minerals within the expansion area are low to moderate, similar to mineral potential within the existing ACEC. Therefore, in general, adverse impacts to minerals, livestock grazing, and motor vehicle use and beneficial impacts to natural resources will increase under Alternative B compared to Alternative A in proportion to the expansion area.

Alternative C

Under Alternative C, the Raymond Mountain ACEC designation is removed and the ACEC expansion is not implemented (see Map 63). The area's location within the Raymond Mountain WSA is expected to result in similar benefits to natural resources and similar constraints to minerals, livestock grazing, and motor vehicle use as described under Alternative A (see the WSA section). In other words, despite

removing the Raymond Mountain ACEC designation, most of the constraints intended to limit resource uses and protect resource values would remain because the area is within the Raymond Mountain WSA.

Alternative D (Proposed RMP)

Under Alternative D, the Raymond Mountain ACEC is retained; however, the expansion is not implemented (see Map 64). Therefore, under Alternative D, benefits to natural resources and constraints to minerals, livestock grazing, and motor vehicle use are expected to be the same as described under Alternative A.

4.7.1.3 Conclusion

Because the Raymond Mountain ACEC is encompassed within the Raymond Mountain WSA, some resource protection and constraints on resource uses associated with the ACEC designation are redundant. Therefore, removal of the ACEC designation under Alternative C is not expected to substantively and adversely impact the Bonneville cutthroat trout or other natural resources. Nor is the removal of the ACEC under Alternative C expected to result in substantive mineral development within the ACEC boundary. Conversely, expansion of the Raymond Mountain ACEC under Alternative B provides added protection to habitats for the Bonneville cutthroat trout, thereby benefiting this species more compared to all other alternatives. Overall, Alternative B provides more benefits to the Bonneville cutthroat trout and other natural resources and constrains mineral development, livestock grazing, and motor vehicle use more compared to all other alternatives.

Special Status Plant Species Habitat ACEC/RNA (Proposed)

Maintaining, stimulating, and supporting reestablishment of special status plant species habitats are the primary objectives for designating the 907-acre ACEC, of which 774 acres are BLM-administered surface and 793 acres are federal mineral estate. Special status plant species documented as occurring within the planning area are listed in Table 3-19.

4.7.1.4 Methods and Assumptions

Methods and assumptions used in the impact analysis include the following:

- Surface-disturbing activities, including ROW, in special status plant habitats adversely impact special status plant species.
- The total amount of new surface disturbance allowed by an alternative is a good index of potential impacts to special status plants. Success of reclamation measures prescribed as a condition of development is unknown, and could underestimate the potential impact of surface disturbance on special status plant populations.
- Reclamation of surface disturbance and reestablishment of vegetation minimizes adverse impacts to soils and, therefore, to special status plant species habitats. The sooner the reestablishment of vegetation occurs, the greater the benefit to special status plant species.
- Management actions associated with protecting wildlife and cultural resource values generally benefit or have no adverse impact on special status plant species.

4.7.1.5 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats for, populations of, and individual special status plants can be impacted by surface-disturbing activities, such as mineral exploration and development, construction associated with communication or

alternative energy (e.g., wind-energy) sites, and construction of roads, pipelines, and other linear features. Other activities that remove vegetation, disturb soil, and (or) provide opportunity for INNS plants to spread and adversely impact habitats for special status plant species include concentrated livestock and native ungulate grazing, intensive recreational use, OHV use, and human plant collection. Grazing (both livestock and wildlife) may provide both adverse and beneficial impacts to special status plant species, depending on grazing intensity, timing and (or) season of grazing, range conditions, and precipitation regimes. Impacts associated with designating or not designating special status plant species' habitats as ACECs/RNAs are described for each alternative.

Alternative A

Under Alternative A, no areas of special status plant species' habitats are designated as ACECs; however, four populations of *Physaria dornii* and a representative cushion plant community in the planning area continue to be protected by an NSO restriction for fluid minerals. In addition, areas where special status plants are known to exist continue to be ROW avoidance areas under Alternative A. Under Alternative A, the use of fire-suppression chemicals and livestock salt or mineral supplements and range improvements are not allowed in special status plant species' habitats. In addition, chemicals must be mixed a minimum of 500 feet away from known special status plant species' habitats according to the *Standard Operating Procedures for Range Improvements and Vegetation Manipulations*. These restrictions within special status plant species' habitats will continue to benefit special status plant species and continue to restrict other resource uses under Alternative A.

Motor vehicle use is not limited in special status plant species' habitats under Alternative A and could adversely impact these species. Disturbances associated with vehicle traffic include contributing dust to the air and on vegetation, crushing vegetation, increasing soil erosion, and (or) providing opportunity for the spread of INNS.

Mineral material sales and (or) free use permits can be authorized on a case-by-case basis in special status plant species habitats; however, the majority of the areas where special status plant species habitats are known to exist exhibit low or moderate oil- and gas-development potential, low-to-moderate phosphate potential, and low coal and trona potential. Under Alternative A, potential habitat areas of special status plant species are areas of CSU for surface-disturbing activities.

Potential habitats of special status plant species on federal or split-estate lands currently require searches for these plant species prior to approval of any project or activity. Should special status plant species be found, all surface-disturbing activities are halted until species-specific protective measures are developed and implemented. Measures to protect special status plants are applied to all actions and use authorizations and include avoidance, NSO for fluid minerals, and no surface disturbance. For federally listed species, protective measures are developed and implemented in coordination with the USFWS.

Alternative B

Under Alternative B, 774 acres of BLM-administered surface and 793 acres of federal mineral estate of special status plant species' habitats are designated as ACECs and populations as RNAs (Map 62). Already proposed under Alternative B without designation as an ACEC or RNA, all known locations of special status plant species are considered ROW exclusion areas and are closed to adverse surface-disturbing activities, mining claim location, mineral materials sale and (or) free use permits, off-road vehicle use, and the use of salt or mineral supplements or range improvements within ½ mile of special status species plant populations. Potential habitats of special status plant species on federal or split-estate lands require searches for these special status plant species prior to approving any project or activity.

Should special status plant species be found, all surface-disturbing activities are halted. See the Special Status Species-Plants section.

In addition, without designation as an ACEC or RNA, Alternative B closes the areas from sodium and phosphate leasable minerals in special status plant species' habitats within the planning area. Closure of these areas under Alternative B, restricts mineral development more and provides more protection to these habitats compared to Alternative A.

Designating special status plant species habitats as ACECs and populations as RNAs under Alternative B provides additional protection to special status plant species to the existing constraints described under their current management (Alternative A). Under ACEC/RNA designations, more emphasis would be on protection, prevention of damage to resources, biological diversity, and scientific study and education (see Special Designations in Chapter 3). However, ACEC and RNA designation of special status species habitats is not anticipated to substantively add to existing or proposed constraints on resource uses under Alternative B. Current and proposed restrictions on mineral leasing under Alternative B affect areas with moderate or low oil- and gas-development potential, low coal- and trona-occurrence potential, and moderate phosphate-occurrence potential in the proposed ACEC/RNA areas.

Alternative C

Under Alternative C, no areas of special status plant species' habitats are designated as ACECs and no populations as RNAs. Impacts from not designating the special status plant species habitats as ACECs and populations as RNAs under Alternative C are the same as described under Alternative A. However, the NSO restriction for fluid minerals on *Physaria dornii* populations, the limitations on surface-disturbing activities, and the requirements for plant surveys would be removed, as described in the Special Status Plants section.

Alternative D (Proposed RMP)

Under Alternative D, 774 acres of BLM-administered surface and 793 acres of federal mineral estate of special status plant species habitats can be designated as an ACEC on a case-by-case basis (Map 64). Special status plant populations that are ACECs are not designated as RNAs. Due to existing and proposed constraints on resource uses intended to protect special status plant species, the impacts of designating habitats for these species as ACECs are not expected to result in substantive additional protection for these species or substantive additional constraints on resource uses compared to Alternative A.

4.7.1.6 Conclusion

Based on existing and proposed constraints on resource uses intended to protect special status plant species, designating habitats for these species as ACECs or populations as RNAs may add some protections for the species, but are not expected to substantively further constrain resource uses. Analysis of the impacts of management actions specific to special status species, but not included as part of the ACEC/RNA designation, is discussed in the Special Status Species – Plants section of this chapter.

Cushion Plant Communities ACEC/RNA (Proposed)

Maintaining and enhancing cushion plant communities is the primary objective for designating the 62-acre ACEC and (or) RNA. Seven endemic species have been documented as occurring within the planning area (maps 62 and 64).

4.7.1.7 Methods and Assumptions

Methods and assumptions used in this impact analysis are the same as those described under special status plant species habitats ACEC/RNA description.

4.7.1.8 Analysis of Alternatives

Impacts Common to All Alternatives

Cushion plant communities can be impacted by surface-disturbing activities, such as mineral exploration and development, construction associated with communication or alternative energy (e.g., wind-energy) sites, and construction of roads, pipelines, and other linear features. Other activities that remove vegetation, disturb soil, and (or) provide opportunity for INNS plants to spread and thus, potentially adversely impact cushion plant communities, include concentrated livestock and native ungulate grazing, intensive recreational use, OHV use, and human plant collection. Impacts associated with designating or not designating cushion plant communities as an ACEC/RNA are described for each alternative.

Alternative A

Under Alternative A, cushion plant communities are not designated as an ACEC and (or) RNA. A cushion plant community currently protected from oil and gas leasing with an NSO restriction on fluid minerals represents less than 1 percent of the known occupied habitat mapped by the Wyoming Natural Diversity Database (WYNDD) (refer to Chapter 3, Special Status Plants). Under Alternative A, not designating additional cushion plant communities as ACECs and (or) RNAs may not fully protect the viability of cushion plant communities in the planning area.

Alternative B

Under Alternative B, 62 acres of cushion plant community are designated as an ACEC and RNA (Map 62). Proposed management actions under Alternative B, not associated with the cushion plant community ACEC/RNA designation, prohibit surface-disturbing activities and surface disturbance of any nature or for any purpose other than for protection or enhancement of the species on known locations of special status plants. Designating cushion plant communities as ACECs and RNAs under Alternative B would place more emphasis on protection, prevention of damage to resources, biological diversity, and scientific study and education in these habitats, but should not increase constraints on resource uses in these communities.

Alternative C

Under Alternative C, cushion plant communities are not designated as ACECs and (or) RNAs, and the NSO restriction for fluid minerals described under Alternative A is removed. Impacts from not designating cushion plant communities as ACECs and RNAs are greater under Alternative C compared to Alternative A due to the removal of the NSO restriction for fluid minerals under Alternative C and the addition of no protected areas. The result is less protection for cushion plant communities and potential threats to viability of the population as a whole.

Alternative D (Proposed RMP)

Under Alternative D, up to 62 acres of cushion plant communities may be designated as an ACEC on a case-by-case basis, in addition to the representative cushion plant communities protected with an NSO restriction for fluid minerals (Map 64). Cushion plant communities designated as an ACEC are not designated as an RNA. In addition to the NSO restriction for fluid minerals, the impacts from designating cushion plant communities as an ACEC under Alternative D add some protection to sensitive plant habitats, while not providing substantial additional constraints on resource uses.

4.7.1.9 Conclusion

Due to existing or proposed management action constraints under alternatives B and D, designation of cushion plan communities as an ACEC or RNA may increase protection for the species, but would not add substantial constraints on resource uses over Alternative A. Under Alternative C, removal of the NSO restriction for fluid minerals in a currently protected cushion plant community could adversely impact cushion plant communities, but may be beneficial to resource uses compared to all other alternatives.

Bridger Butte ACEC (Proposed)

Protecting, preserving, and enhancing cultural, historical, and Native American values, as well as rare plant species that exist in the area, are the primary objectives for designating the Bridger Butte ACEC (see maps 62 and 64).

4.7.1.10 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Future development in Bridger Butte will require ROW for roads, pipelines, and possibly powerlines. Specific placement of these ancillary facilities will be guided by compliance with Section 106 of the NHPA and planned to minimize visual intrusions. Restrictions on placing ROW in the Periphery Area will be project-specific.
- Leases within the Bridger Butte contain various stipulations concerning surface disturbance, surface occupancy, and limited surface use. In addition, the lease stipulations provide that the U.S. Department of the Interior may impose "such reasonable conditions, not inconsistent with the purposes for which [the] lease is issued, as the [BLM] may be required to protect the surface of the leased lands and the environment." None of the stipulations, however, would empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.

4.7.1.11 Analysis of Alternatives

Impacts Common to All Alternatives

In general, land use authorizations that include surface disturbance can physically disrupt the archeological component of an area with subsequent loss of valuable scientific data. Further, increased activity compromises traditional cultural values, such as tranquility and isolation, which are important to Native Americans. Increased development in Bridger Butte could further diminish the suitability of the area for ceremonial purposes. The various alternatives define how land use activities are balanced against scientific and traditional values. Because not all alternatives designate Bridger Butte as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Bridger Butte area is not designated as an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 1,127 acres of BLM-administered surface are designated as the Bridger Butte ACEC (Map 62). The area is an exclusion area for ROW corridors, wind-energy projects, and other surface-disturbing activities; is closed to OHV use; and is excluded from prescribed fires and vegetation treatments on BLM-administered lands within the ACEC boundary. The restrictions on resource uses

associated with this ACEC designation will provide more protection to cultural, historical, and Native American values compared to all other alternatives. However, these restrictions will adversely impact wind energy, mineral development, and OHV use. Prohibiting use of prescribed fires and vegetation treatments also could have an adverse impact on natural resources by limiting the flexibility of BLM managers to improve existing plant communities in the area. Wind-energy occurrence in the proposed ACEC is classified as moderate to high. Oil- and-gas development potential and coal- and trona-occurrence potential in the area are classified as low. Phosphate occurrence potential in the area is moderate. Due to the relatively small size (1,127 acres) and the overall mineral development and occurrence potential of the proposed area, adverse impacts to wind-energy and mineral development are not expected to be substantial; however, they are expected to be more under Alternative B than under all other alternatives.

Alternative C

Under Alternative C, Bridger Butte is not designated as an ACEC. Beneficial and adverse impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, 727 acres of BLM-administered surface are designated as the Bridger Butte ACEC (Map 64). Impact types under Alternative D are the same as those described under Alternative B; however, the intensity of impacts is expected to be slightly less due to the smaller size of the proposed ACEC under Alternative D. Under Alternative D, the benefits to cultural, historical, Native American values, and rare plant species from designating the ACEC are greater compared to alternatives A and C. Likewise, the adverse impacts to resource uses are more under Alternative D compared to alternatives A and C.

4.7.1.12 Conclusion

Alternatives A and C include the fewest restrictions and, therefore, provide the least adverse impact to other resource uses compared to other alternatives. Conversely, alternatives A and C provide the least protection for cultural, historical, and Native American values compared to other alternatives. Due to the difference in ACEC acres proposed, Alternative B provides the most benefit to cultural, historical, and Native American values and the most adverse impacts to wind energy, mineral development, and OHV use compared to all alternatives, followed by Alternative D.

White-tailed Prairie Dog ACEC (Proposed)

Maintaining and ensuring a self-sustaining population of the white-tailed prairie dogs by managing to preserve white-tailed prairie dog colonies, complexes, and associated habitats is the primary objective for designating the 30,913-acre ACEC (see Map 62).

4.7.1.13 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.14 Analysis of Alternatives

Impacts Common to All Alternatives

Contiguous wildlife habitats can be adversely impacted by activities, such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation.

Because not all alternatives designate white-tailed prairie dog complexes as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, white-tailed prairie dog complexes are not designated as an ACEC and resource uses, such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the complexes in accordance with current management.

Alternative B

Under Alternative B, 30,913 acres of BLM-administered surface and 28,739 acres of federal mineral estate of white-tailed prairie dog complexes more than 100 acres in size are designated ACECs and protected with restrictions on surface-disturbing activities (Map 62). Designation of the white-tailed prairie dog complexes ACECs under Alternative B is anticipated to protect habitats from surface-disturbing activities and thereby benefit the resident white-tailed prairie dogs and associated wildlife species more compared to Alternative A. Designating ACECs for white-tailed prairie dog complexes that encompass private land ownership may adversely impact private landowners who own or manage livestock within the ACEC. Prairie dogs reduce vegetation and, therefore, affect forage used by livestock.

In addition, the proposed ACEC under Alternative B will prohibit mineral development. However, since most of the proposed ACEC area is classified as low-to-moderate oil- and gas-development potential, and low occurrence potential for coal, phosphate, and trona, the designation under Alternative B is not expected to substantively and adversely restrict mineral development.

Alternative C

Under Alternative C, white-tailed prairie dog complexes are not designated as ACECs. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, white-tailed prairie dog complexes are not designated as ACECs. Impacts are the same as those described under Alternative A.

4.7.1.15 Conclusion

Only Alternative B designates white-tailed prairie dog complexes as ACECs. This designation would be beneficial to white-tailed prairie dogs, as well as associated wildlife species, and may adversely impact mineral development, although not substantially. Alternatives A, C, and D do not designate white-tailed prairie dog complexes as ACECs and are, therefore, not expected to have any additional benefits to white-tailed prairie dogs or adverse impacts to mineral development.

Dry Fork Watershed ACEC (Proposed)

Protecting Bonneville cutthroat trout and leatherside chub habitats are the primary objectives for designating the 4,690-acre Dry Fork Watershed ACEC. The Dry Fork Watershed provides yearlong habitats for all life stages of the core conservation populations of the Bonneville cutthroat trout and other native nongame aquatic species (see Map 62).

4.7.1.16 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.17 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats can be adversely impacted by activities such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate the Dry Fork Watershed as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Dry Fork Watershed is not designated as an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 3,172 acres of BLM-administered surface and 4,054 acres of federal mineral estate are designated as the Dry Fork Watershed ACEC (Map 62). Designating the Dry Fork Watershed ACEC will limit access for and adversely impact livestock grazing, mineral development activities, OHV use, and recreation. These restrictions are anticipated to reduce soil erosion, maintain or enhance riparian and other vegetation communities, and maintain or enhance aquatic habitats for the Bonneville cutthroat trout and leatherside chub. Given the relatively small size of the proposed ACEC and the fact that oil- and gas-development potential in the area is low and occurrence potential for coal, phosphate, and trona in the area is low to moderate, the adverse impact to mineral development is not expected to be substantial.

Alternative C

Under Alternative C, the Dry Fork Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the Dry Fork Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

4.7.1.18 Conclusion

Only Alternative B designates the Dry Fork Watershed as an ACEC. This designation is expected to protect the area from disturbance and therefore benefit the Bonneville cutthroat trout and riparian habitats in the area. In addition, the proposed ACEC may adversely impact mineral-development activities, livestock grazing, OHV use, and recreation by restricting these resource uses on a relatively small acreage. Alternatives A, C, and D do not designate the Dry Fork Watershed an ACEC and are therefore not expected to benefit the Bonneville cutthroat trout and leatherside chub habitats or to have any substantial adverse impact on resource uses.

Upper Tributary Watershed ACEC (Proposed)

Protecting Bonneville cutthroat trout and leatherside chub habitats are the primary objectives for designating the 5,595-acre Upper Tributary Watershed ACEC (see Map 62).

4.7.1.19 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.20 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats can be adversely impacted by activities such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate the Upper Tributary Watershed as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Upper Tributary Watershed is not designated an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 4,291 acres of BLM-administered surface and 4,924 acres of federal mineral estate are designated as the Upper Tributary Watershed ACEC. Benefits from designating the Upper Tributary Watershed ACEC under Alternative B include protecting the Bonneville cutthroat trout, leatherside chub, and riparian habitats in the area. Potential adverse impacts from designating the Upper Tributary Watershed ACEC include restrictions on livestock grazing, mineral-development activities, OHV use, and recreation. Given the relatively small size of the proposed ACEC and the fact that oil- and gas-development potential in the area is low and occurrence potential for coal, phosphate, and trona in the area is low to moderate, the adverse impact to mineral development is not expected to be substantial.

Alternative C

Under Alternative C, the Upper Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the Upper Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

4.7.1.21 Conclusion

Only Alternative B designates the Upper Tributary Watershed an ACEC. This designation is expected to benefit the Bonneville cutthroat trout, leatherside chub, and riparian areas, and have negligible adverse impacts on mineral-development activities, livestock grazing, OHV use, and recreation because of the relatively small acreage. Alternatives A, C, and D do not designate the Upper Tributary Watershed an ACEC and, therefore, are not expected to benefit the Bonneville cutthroat trout and leatherside chub habitats or to have any substantial adverse impact on resource uses.

Lower Tributary Watershed ACEC (Proposed)

Protecting Bonneville cutthroat trout and leatherside chub habitats is the primary objective for designating the 1,371-acre Lower Tributary Watershed ACEC (see Map 62).

4.7.1.22 Methods and Assumptions

Methods and assumptions used in this impact analysis are identified at the beginning of Chapter 4.

4.7.1.23 Analysis of Alternatives

Impacts Common to All Alternatives

Habitats can be adversely impacted by activities, such as vegetation treatments, fire and fuels management, mineral exploration and extraction, construction and maintenance of roads and trails, development of wind-energy facilities, improper livestock grazing, OHV use, and recreation. Because not all alternatives designate the Lower Tributary Watershed as an ACEC, impacts are described for each alternative.

Alternative A

Under Alternative A, the Lower Tributary Watershed is not designated an ACEC and resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 1,351 acres of BLM-administered surface and 1,359 acres of federal mineral estate are designated the Lower Tributary Watershed ACEC. Benefits from designating the Lower Tributary Watershed ACEC under Alternative B include protecting Bonneville cutthroat trout and leatherside chub habitats. Potential adverse impacts from designating the Lower Tributary Watershed ACEC include limited access to the area for livestock grazing, mineral-development activities, OHV use, and recreation. Given the relatively small size of the proposed ACEC and the fact that oil- and gas-development potential in the area is low and occurrence potential for coal, phosphate, and trona in the area is low to moderate, the adverse impact to mineral development is not expected to be substantial.

Alternative C

Under Alternative C, the Lower Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the Lower Tributary Watershed is not designated as an ACEC. Impacts are the same as those described under Alternative A.

4.7.1.24 Conclusion

Only Alternative B designates the Lower Tributary Watershed an ACEC. This designation is anticipated to benefit the Bonneville cutthroat trout and leatherside chub habitats and have negligible adverse impacts on mineral development activities, livestock grazing, OHV use, and recreation because of the relatively small acreage. Alternative A, C, and D do not designate the Lower Tributary Watershed an ACEC and, therefore, are not expected to benefit the Bonneville cutthroat trout and leatherside chub habitats or to have any substantial adverse impact on resource uses.

Fossil Basin ACEC/MA (Proposed)

Protecting fossil resources is the primary objective for designating the 451,452-acre Fossil Basin as an ACEC or establishing the area as an MA (see Map 62).

4.7.1.25 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- Direct impacts to paleontological resources from designating or not designating the Fossil Basin ACEC, or establishing the area as an MA will typically result from actions that physically alter, damage, or destroy fossils or their contexts. For example, any type of surface disturbance in an area containing fossil resources could have a direct impact by disturbing important paleontological values. These actions also may have an indirect impact by providing greater access to the area, which can bring increased vandalism, removal of materials, and inadvertent damage that could impact fossils or their contexts.
- Actions that result in data collection and preservation of paleontological resources are considered beneficial impacts.
- Scientifically important fossils will continue to be found within the ACEC/MA.
- Adverse impacts to paleontological resources occur from physical damage or destruction of fossils, from loss of related scientific data, and from transfer from public ownership.
- Adverse impacts to paleontological resources from surface-disturbing activities occur primarily at the time the initial surface disturbance occurs. Therefore, it is valid to use the projected numbers for short-term surface disturbance to quantify impacts to paleontological resources. Erosion resulting from long-term surface disturbance, or from naturally occurring climatic events, can adversely impact paleontological resources, but not to the extent of short-term surface disturbance.
- In some cases, surface-disturbing activities require paleontological surveys prior to impacts occurring. These surveys, and monitoring of construction, sometimes result in identifying information about the resource that would otherwise be unavailable, and also result in the collection and curation of fossils for further research. In these cases, surface-disturbing activities can provide a benefit to the resource.

4.7.1.26 Analysis of Alternatives

Impacts Common to All Alternatives

Impacts to paleontological resources from surface-disturbing activities, visitor accessibility, OHV use, and proactive paleontological resource management actions are described under the individual alternatives because not all alternatives designate the Fossil Basin as an ACEC or establish the area as an MA.

Alternative A

Under Alternative A, the Fossil Basin area is not designated as an ACEC and the area is not established as an MA. Under Alternative A, resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management. Potential adverse impacts to fossil resources would result from surface-disturbing activities associated with these resource uses, and be greater than those under Alternative B.

Alternative B

Under Alternative B, 201,660 acres of BLM-administered surface and 250,146 acres of federal mineral estate are designated the Fossil Basin ACEC or established as an MA (Map 62). Anticipated benefits

under Alternative B include greater preservation and protection of the fossil resources in the area, compared to other alternatives. However, the fossil resource is less likely to be discovered under this alternative. Potential adverse impacts from designating the Fossil Basin ACEC or establishing the area as an MA include restricting other resource uses in the area. The proposed area is a mixture of low, moderate, and high oil- and gas-development potential; low occurrence potential for coal; and low, moderate, and high occurrence potential for phosphate. The relatively large size of the proposed area and occurrence and development potential of minerals could adversely impact mineral development.

Alternative C

Under Alternative C, the Fossil Basin area is not designated as an ACEC and (or) established as an MA. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the Fossil Basin area is not designated as an ACEC and (or) established as an MA. Impacts are the same as those described under Alternative A.

4.7.1.27 Conclusion

Only Alternative B designates the Fossil Basin as an ACEC or establishes the area as an MA. This designation provides more benefit to fossil resources in the area compared to other alternatives; however, it is expected to adversely impact resource uses requiring surface-disturbing activities, such as mineral development. Alternatives A, C, and D provide less protection for fossils in Fossil Basin than Alternative B.

Rock Creek/Tunp MA (Proposed)

Protecting and enhancing critical wildlife habitats and cultural resources are the primary objectives for establishing the Rock Creek/Tunp MA (see maps 62 and 64).

4.7.1.28 Methods and Assumptions

Because the objective of this designation is to protect multiple, sensitive overlapping resources, methods and assumptions for this impact analysis are the same as those listed under the specific resource sections in this chapter.

4.7.1.29 Analysis of Alternatives

Impacts Common to All Alternatives

Because not all alternatives establish the Rock Creek/Tunp MA, impacts are described for each alternative.

Alternative A

Under Alternative A, the Rock Creek/Tunp MA is not established. Under Alternative A, resource uses, such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 63,278 acres of BLM-administered surface and federal mineral estate are established for the Rock Creek/Tunp MA (Map 62). Under Alternative B, the Rock Creek/Tunp MA

includes specific management actions to protect wildlife and cultural resource values, including making the area administratively unavailable for all new mineral lease considerations; prohibiting mineral material sales and (or) free use permits; pursuing mineral withdrawals for locatable minerals; restricting new ROW actions to existing utility corridors; prohibiting new road developments, surface disturbance, high-profile structures, and wind-power facilities; pursuing reclamation of select existing roads; restricting OHV use to open roads and off-trail travel without prior approval from the authorized officer; retaining existing character of the landscape for NHTs and site settings; maintaining existing federal active AUMs; restricting placement of salt licks and mineral supplements; controlling and eradicating noxious weeds; and maintaining plant community and wildlife habitat needs. Management actions restricting resource uses within the proposed area are anticipated to increase protection of sensitive overlapping wildlife habitats and cultural resources, compared to Alternative A. Conversely, these same restrictions are anticipated to adversely impact wind-energy and mineral development, livestock grazing, and OHV use. Given the relatively small size of the proposed MA and the fact that the area is classified as having low oil- and gas-development potential, low coal- and trona-occurrence potential, and moderate phosphate occurrence potential, adverse impacts to mineral development are not expected to be substantial.

Alternative C

Under alternative C, the Rock Creek/Tunp MA is not established. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, 45,863 acres of BLM-administered surface and federal mineral estate are established as the Rock Creek/Tunp MA (Map 64). In addition to establishing a smaller area under Alternative D compared to Alternative B, the management actions intended to protect wildlife and cultural resource values are more flexible under Alternative D, including making the area administratively unavailable for all new fluid mineral lease considerations (expired leases are not reissued); restricting all new ROW actions to existing disturbance zones; authorizing no wind-power facilities; allowing no net loss of habitat function from any construction activity within the boundaries of the management area (habitat restoration could offset disturbances); restricting OHV use to existing roads and trails (allowing no off-trail travel without prior approval from the authorized officer); allowing no salt licks or mineral supplements within ¼ mile of live water, sensitive wildlife areas (e.g., greater sage-grouse leks), special status plant locations, NHTs, and cultural sites that are eligible for or listed on the NRHP; and developing plant community objectives and continuing to implement appropriate management to meet and maintain wildlife habitat needs. The area is administratively unavailable for solid leasable minerals; however, the area is administratively available for mineral materials use and (or) free use permits and available for locatable mineral entry. Forage associated with newly acquired federal lands is available for livestock use under Alternative D. INNS are managed according to Partners Against Weeds. Therefore, the types of impacts caused by establishing the Rock Creek/Tunp MA under Alternative D are similar to those described under Alternative B; however, the intensity of beneficial and adverse impacts are less under Alternative D due to the smaller size of the MA and more flexibility in management actions.

4.7.1.30 Conclusion

Alternatives A and C do not identify the Rock Creek/Tunp as an MA and, therefore, these alternatives are not anticipated to benefit wildlife and cultural resource values or to adversely impact resource uses in the proposed MA. Alternative B establishes more acres as the Rock Creek/Tunp MA and includes more constraining prescriptions intended to protect wildlife and cultural resource values compared to Alternative D. Alternative B is anticipated to result in the most benefits to wildlife and cultural resource values and the most adverse impact to resource uses compared to all alternatives. Alternative D

establishes a smaller area for the proposed MA and provides more flexibility in management actions to protect resource uses, resulting in less adverse impact compared to Alternative B and more benefits to resource values compared to alternatives A and C.

Bear River Divide MA (Proposed)

Protecting and enhancing critical wildlife habitats, cultural resources, and paleontological resources are the primary objectives for establishing the Bear River Divide MA (see maps 62 and 64).

4.7.1.31 Methods and Assumptions

Because the objective of this establishment is to protect multiple, sensitive overlapping resources, methods and assumptions for this impact analysis are the same as those listed under the specific resource sections in this chapter.

4.7.1.32 Analysis of Alternatives

Impacts Common to All Alternatives

Because not all alternatives establish the Bear River Divide MA, impacts are described for each alternative.

Alternative A

Under Alternative A, the Bear River Divide is not established as an MA. Under Alternative A, resource uses such as mineral development, wind-energy development, OHV use, prescribed fire and vegetative treatments, livestock grazing, and ROW corridors are allowed within the area in accordance with current management.

Alternative B

Under Alternative B, 146,322 acres of BLM-administered surface and 147,156 acres of federal mineral estate are established as the Bear River Divide MA (Map 62). Under Alternative B, the Bear River Divide MA includes specific management actions to protect wildlife, cultural, and paleontological resource values, including making the area administratively unavailable for all new mineral lease considerations; prohibiting mineral material sales and (or) free use permits; pursuing mineral withdrawals for locatable minerals; restricting new ROW actions to existing utility corridors; prohibiting new road developments, surface disturbance, high-profile structures, and wind-power facilities; pursuing reclamation of select existing roads; restricting OHV use to open roads and off-trail travel without prior approval from the authorized officer; retaining existing character of the landscape for NHTs and site settings; maintaining existing federal active AUMs; restricting placement of salt licks and mineral supplements; controlling and eradicating noxious weeds; maintaining plant community and wildlife habitat needs; and studying and protecting important paleontological resources in the Fossil Basin area. Management actions restricting resource uses within the proposed area are anticipated to increase protection of wildlife habitats and cultural and paleontological resources compared to Alternative A. Conversely, these same restrictions are anticipated to adversely impact wind-energy and mineral development, livestock grazing, and OHV use. Given the size of the proposed MA and the fact that the area is classified as low to high for oil- and gas-development potential, low to moderate for coal- and phosphate-occurrence potential, adverse impacts to mineral development are expected under Alternative B.

Alternative C

Under Alternative C, the Bear River Divide area is not established as an MA. Impacts are the same as those under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, 74,954 acres of BLM-administered surface and 74,258 acres of federal mineral estate are identified as the Bear River Divide MA (Map 64). Under Alternative D, only part of the Bear River Divide MA (31,802 acres) is identified as administratively unavailable for oil and gas leasing. In addition to identifying a smaller area under Alternative D, the management actions intended to protect wildlife and cultural, resource values are more flexible compared to Alternative B, and no other management actions are identified for paleontological resource values under Alternative D. However, more intensive requirements for surface reclamation, routing of linear facilities and winter uses will be applied. Therefore, the types of impacts caused by identifying the Bear River Divide MA under Alternative D are similar to those described under Alternative B; however, the intensity of beneficial and adverse impacts are less under Alternative D due to the smaller size area and greater flexibility in management actions.

4.7.1.33 Conclusion

Alternatives A and C do not identify the Bear River Divide as an MA and, therefore, these alternatives are not anticipated to benefit wildlife, cultural, and paleontological resource values or to adversely impact other resource uses in the proposed MA. Alternative B establishes more acres as the Bear River Divide MA and includes more constraining prescriptions intended to protect wildlife, cultural, and paleontological resource values compared to Alternative D. Alternative B is anticipated to result in the most benefits to wildlife, cultural, and paleontological resource values and the most adverse impact to other resource uses compared to all alternatives. Alternative D establishes a smaller area for the proposed MA and provides more flexibility in management actions to protect resource values, resulting in less adverse impact compared to Alternative B, but does not provide additional benefits to paleontological resource values. However, more benefits to wildlife and cultural resource values may occur under Alternative D compared to alternatives A and C.

4.7.2 Wild and Scenic Rivers

Protecting and enhancing scenic qualities, fisheries, recreation, and wildlife values, and the relatively unmodified character of the area in a near-natural setting, are the primary objectives for considering up to 13 waterway segments as suitable for inclusion in the WSR system (see maps 62 and 64). Any rivers that are not determined suitable for inclusion in the WSR system would continue to be managed in the same manner as waterways on the adjacent BLM lands.

4.7.2.1 Methods and Assumptions

Methods and assumptions used in this analysis are identified at the beginning of Chapter 4.

4.7.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

Because not all alternatives identify the WSRs, impacts are described for each alternative.

Alternative A

Under Alternative A, 13 eligible waterway segments are managed to protect the free-flowing values and tentative classification of these segments as WSRs; however, none of the segments is designated for suitability or nonsuitability as a WSR. Resource use of these areas is reviewed on a case-by-case basis and applicable protective management is applied, subject to valid existing rights. For waterway segments currently located in the Raymond Mountain WSA, impacts would be the same as those described under Alternative A of the Raymond Mountain WSA, as the segments that lie within the Raymond Mountain

WSA are already managed under the *Interim Management Policy and Guideline for Lands Under Wilderness Review: Update Document H-8550, 11/10/87* (IMP) (BLM 1995a).

Alternative B

Under Alternative B, all 13 waterway segments are recommended suitable for inclusion in the National Wild and Scenic Rivers system. Based on GIS analysis of waterway segments, Alternative B would have the greatest adverse impact to resource uses in the areas of these waterway segments of all alternatives, as management would focus on protecting the waterway segments. Specific management for each segment is based on a case-by-case review. For segments currently located in the Raymond Mountain WSA (including Huff Creek and Raymond Creek), impacts would be the same as those described under Alternative A of the Raymond Mountain WSA, as this area is managed under the WSA IMP (BLM 1995a) in a fashion suitable to WSR designation.

Alternative C

Under Alternative C, none of the 13 waterway segments are recommended suitable for inclusion in the National Wild and Scenic Rivers system. Alternative C would have the least adverse impacts to resources uses, as this alternative would have the least protective measures for these waterway segments. These areas would be managed the same as adjacent federal lands. For segments currently located in the Raymond Mountain WSA (including Huff Creek and Raymond Creek), impacts would be the same as those described under Alternative A of the Raymond Mountain WSA, as this area is managed under the WSA IMP (BLM 1995a) in a fashion suitable to WSR designation.

Alternative D (Proposed RMP)

Alternative D recommends two waterway segments (Huff Creek and Raymond Creek) suitable for inclusion in the National Wild and Scenic Rivers system. Impacts from designating these two waterway segments as suitable for inclusion in the WSR system under Alternative D are the same as those described under Alternative A of the Raymond Mountain WSA, as most of these creeks lie within the Raymond Mountain WSA and the area is already managed under the WSA IMP (BLM 1995a) in a fashion suitable to WSR designation. Management of these segments would protect the values for which the segments were designated.

4.7.2.3 Conclusion

Alternative B would provide the most benefit to scenic qualities, fisheries, and wildlife values, and the near-natural setting for 13 waterway segments if these segments are added to the National Wild and Scenic Rivers system. Alternative D would provide the second most benefit to these same values. Alternatives A and C would allow resource uses in the areas of these waterway segments; however, Alternative A would provide more protection to these segments by allowing resources uses on a case-by-case basis.

4.7.3 Wilderness Study Areas

Raymond Mountain WSA (Existing)

Maintaining and emphasizing preservation of the flora and fauna within the naturally occurring ecosystems is the primary objective for designating the 32,880-acre Raymond Mountain WSA.

4.7.3.1 Methods and Assumptions

Methods and assumptions used in the impact analysis include the following:

- Raymond Mountain WSA will remain under the *Interim Management Policy and Guideline for Lands Under Wilderness Review: Update Document H-8550, 11/10/87* (IMP) (BLM 1995a) until Congress designates them wilderness or releases them for other nonwilderness uses.
- The WSA designation is beneficial to, the protection of air and watersheds, soil and water quality, ecological stability, plant and animal gene pools, archeological and historical sites, habitats for wildlife, and livestock grazing.

4.7.3.2 Analysis of Alternatives

Impacts Common to All Alternatives

Under all alternatives, the 32,880 acres continue to be designated as the Raymond Mountain WSA and are managed under the WSA IMP, which "is temporary and applies only during the time an area is under wilderness review and until Congress acts on WSAs…" (BLM 1995a). If Congress acts and designates the area as wilderness, it will be managed under BLM Manual 8560. If Congress acts and does not designate the area as wilderness, it will be managed under general BLM management policies, with some exceptions described under specific alternatives for other types of proposed management. Lands adjacent to the Raymond Mountain WSA currently are not managed as wilderness.

Alternative A

Under Alternative A, the 32,880 acres continue to be designated as the Raymond Mountain WSA, and managed under the WSA IMP (Map 61). No new leases or exploration licenses may be issued on lands within the WSA. Outside of existing limitations due to unpatented mining claims, the planning area is available for consideration of mineral materials sales and (or) free use permits. No new sodium leases or exploration licenses may be issued on lands within the Raymond Mountain WSA. This applies to public lands, including split-estate lands where federal mineral estate underlies nonfederal surface, within the boundaries of the WSA. Most of the WSA is closed to OHV use, motor vehicle travel, and snowmobile use. Under Alternative A, the Raymond Mountain WSA remains a high-priority area for access acquisition.

Benefits from retaining the area as the Raymond Mountain WSA under Alternative A include enhanced protection of the flora and fauna, air and watersheds, soil and water quality, ecological stability, plant and animal gene pools, archeological and historical sites, habitats for wildlife, and livestock grazing within the naturally occurring ecosystems. Potential adverse impacts from retaining the Raymond Mountain WSA under Alternative A are expected to be minimal to resource uses as the area exhibits low oil and gas, coal, and phosphate development potential. In addition, less than 300 acres in the area exhibit wind-energy development potential.

Alternative B

Under Alternative B, if Congress acts and does not designate the area as wilderness, the 32,880 acres will continue to be managed under the WSA IMP (BLM 1995a) (Map 62). Therefore, impacts under Alternative B are the same as those described under Alternative A.

Alternative C

Under Alternative C, if Congress acts and does not designate the area as wilderness, the 32,880 acres will be managed in the same manner as adjacent BLM-administered lands. Beneficial impacts under Alternative C includes fewer restrictions on other resource uses; adverse impacts include loss of protection for the floral, faunal and other natural, cultural, and livestock resources found within the naturally occurring ecosystems.

Alternative D (Proposed RMP)

Under Alternative D, if Congress acts and does not designate the area as wilderness, the 32,880 acres will continue to be managed under the WSA IMP (BLM 1995a) until a new management plan is prepared and the RMP is amended. Therefore, impacts under Alternative D are the same as Alternative B until a new management plan is prepared.

4.7.3.3 Conclusion

Until Congress acts, the alternatives are not quantifiably different and will have the same impacts as described under Alternative A. If Congress acts and does not designate the area wilderness, then Alternative B provides the most benefit to the preservation of the flora and fauna within the naturally occurring ecosystems, followed by alternatives D and C respectively.

4.7.4 Back Country Byways

Emigrant Springs Back Country Byway (Proposed)

Enhancing motorized recreation, camping, hunting, mountain bike riding, wildlife viewing, horseback riding and heritage tourism is the primary objective for designating the Emigrant Springs Back Country Byway (see Map 65). This proposed back country byway would include approximately 4.5 miles of primitive two-track road and approximately 11 miles of crowned and ditched gravel road.

4.7.4.1 Methods and Assumptions

Methods and assumptions used in the impact analysis include the following:

- No additional land use constraints are associated with designation of the Emigrant Springs Back Country Byway.
- Impacts to other resources from constraints associated with cultural resources and VRM are discussed in the respective sections of this chapter.
- Establishment of the Emigrant Springs Back Country Byway will increase use of the road and increase human presence in the area.
- Developments along the BLM-administered land immediately adjacent to the Emigrant Springs Back Country Byway will be restricted to prevent resource conflicts.

4.7.4.2 Analysis of Alternatives

Impacts Common to All Alternatives

Existing adverse and beneficial impacts from the Emigrant Springs road will continue under all alternatives regardless of designation and are considered negligible. Long-term adverse impacts from the current unimproved road are the same as impacts from similar primitive roads in the planning area and include habitat fragmentation, fugitive dust, increased erosion, and potential spread of INNS plant seeds and (or) parts.

Alternative A

Under Alternative A, the current unimproved road remains a primitive four-wheel drive road extending from State Highway 233 from Kemmerer to Dempsey Basin Road, a portion of the improved BLM road-Dempsey Basin and unimproved two-track route from Dempsey Basin to Fossil Butte, moderately improved single-lane gravel road through Fossil Butte National Monument, and back onto State Highway 30 to Kemmerer (Map 65). All of the current route is considered primitive and is not designated as a Back Country Byway. Interpretive signs and viewing areas do not exist for the road.

Alternative B

Under Alternative B, the Emigrant Springs road is designated as a Back Country Byway, remains a primitive four-wheel drive road, and is not upgraded from current conditions (Map 65). Road development will be in cooperation with Lincoln County, the National Park Service, and the State of Wyoming. The back country byway will include 4.5 miles of the primitive two-track and 11 miles of crowned and ditched gravel road. The area is managed to provide opportunities to visitors to engage in targeted activities, providing no less than 90 percent of visitors a realization of targeted benefits, while encouraging responsible motorized recreational use of the back country byway and protecting the scenic, cultural, and critical wildlife habitat values that occur in the area. Most of the area will be managed as VRM Class II, and existing facilities will be maintained.

Under Alternative B, beneficial impacts from the Emigrant Springs Back Country Byway include creating a viable transportation route, back country access, and recreation, wildlife, and scenic viewing opportunities. These benefits allow a positive change for residents and visitors, providing the opportunity for experiencing aesthetic appreciation, identification with a special place, improved perception of the quality of life, and improved image of the area and its recreational opportunities. Environmental benefits include creating a sense of "ownership" and stewardship of the historic area, while protecting natural habitats and open space by reducing the temptation for recreators to travel off-road. Economic benefits include retaining recreational spending in local areas, increased contributions to the local economies and increased attractiveness of the area. Potential adverse impacts from designating the Emigrant Springs Back County Byway under Alternative B include increased use of the Emigrant Springs road, and potential increases in soil erosion, road maintenance, and fugitive dust from traffic. In addition, increased human presence and activity in the area may adversely impact biological and heritage resources due to litter, unauthorized plant collection, spread of plant INNS, vandalism, and disruption of wildlife.

Alternative C

Under Alternative C, the Emigrant Springs road is not designated a Back Country Byway. Impacts are the same as those described under Alternative A.

Alternative D (Proposed RMP)

Under Alternative D, the Emigrant Springs road is not designated as a Back Country Byway. Impacts are the same as those described under Alternative A.

4.7.4.3 Conclusion

Alternatives A, C, and D do not designate the existing Emigrant Springs road as a Back Country Byway and are not expected to provide any additional benefit to motorized recreation, camping, hunting, mountain bike riding, wildlife viewing, horseback riding, or heritage tourism. Alternative B does designate the Emigrant Springs road as a Back Country Byway, and is expected to have beneficial impacts to motorized recreation, camping, hunting, mountain bike riding, wildlife viewing, horseback riding, and heritage tourism. Adverse, long-term impacts from the existing road will continue under all alternatives and include habitat fragmentation, fugitive dust, increased erosion, and spread of plant INNS. The anticipated increase in traffic and use of the area following designation as a Back Country Byway under Alternatives B may be associated with greater adverse impacts from litter, unauthorized plant and cultural resource collection, soil erosion, road maintenance, spread of plant INNS, and vandalism compared to other alternatives.

4.8 Socioeconomic Resources

4.8.1 Social Conditions

This section addresses the potential for the alternatives to have impacts on social conditions in the planning area, including direct, indirect, short-term, and long-term impacts. This analysis may also provide a suitable starting point for local governments to use in local planning efforts. In addition, the BLM anticipates that site specific implementation or project analysis will occur in accordance with governing law and regulations as the RMP allocation decisions are implemented. This analysis process will provide an opportunity for the BLM, State of Wyoming and the affected counties and communities to collaborate in disclosing the socio-economic impacts associated with the site specific action being analyzed. Laws, regulations, policies, and guidance considered in the analysis of social conditions are identified in Appendix P.

The BLM acknowledges that state and local governments may collect or develop more refined social and economic data and that local plans may be developed by the impacted counties, municipalities or communities that attempt to address social and economic matters affecting them. This planning effort by state and local governments may address some or all of the social and governmental services within its purview, and may contain the detailed budgetary requirements necessary to carry the plan forward.

Potential impacts that relate to social conditions include changes in population, such as fluctuations caused by economic boom and bust cycles; changes in the demand for housing and community services, along with community fiscal conditions, which can impact the ability of state, regional, and local governments to supply community services such as education; and changes in community character, culture, and social trends. The BLM does not directly manage social conditions in the planning area; however, BLM management actions could impact social conditions indirectly. For example, a decision to prohibit future oil and gas exploration or leasing on federal mineral estate could adversely impact job opportunities in the planning area, which could lead to reductions in populations in parts of the planning area as residents move away to find job opportunities elsewhere (or as fewer people move to the planning area for jobs). For the purpose of this analysis, short-term social impacts are defined as those that would last for 5 years or less, while long-term social impacts are defined as those that would last for more than 5 years.

4.8.1.1 Methods and Assumptions

Impacts to social conditions associated with each of the alternatives were compared to existing conditions and trends in the planning area to establish a context for the impacts. As noted in Section 3.8.1 Social Conditions, BLM management actions can impact social conditions in nearby communities as well as the planning area; thus, the analysis of social and economic impacts encompasses the entire counties of Lincoln, Uinta, and Sweetwater. Social impacts were classified broadly into three categories: impacts on population, impacts on housing and community services, and impacts on custom, culture, and social trends.

Assumptions used in this impact analysis include the following:

- Economic conditions, especially jobs, labor earnings, and economic output, will continue to be a driver of population growth in the planning area.
- Any population change that could reasonably be associated with the alternatives will likely be due to changes in employment opportunities.
- Federal, state, and local taxes will continue to be collected on minerals produced in the planning area.

The pace and timing of future mineral and energy resource development in the planning area will depend on many factors beyond the management actions of the BLM. History and reason suggest that future development will likely vary over time, potentially quite dramatically. However, because of the uncertainty in projecting the pace and timing of future development, the assessment of social and economic consequences is based on a relatively constant level of development over time. That assumption results in the portrayal of average changes or impacts over time, even though those specific changes may not actually occur or be observed. Actual social and economic impacts would depend on changes in the rate of development, and would include the potential for adverse impacts associated with boom and bust cycles.

4.8.1.2 Analysis of Alternatives

Impacts Common to All Alternatives

Any population change that could reasonably be associated with the alternatives would likely be due to changes in employment opportunities. Employment opportunities related to activities on BLM-administered surface land and federal mineral estate include jobs in exploration, development, and production of minerals, including oil and gas, coal, trona, locatable and salable minerals; jobs in livestock production; jobs in various recreational activities and OHV use; and other jobs that rely on land administered by the BLM, such as management of wildlife and plant species that use BLM-administered lands. The economic analysis provides quantitative estimates of employment in the planning area due to oil and gas, grazing, and recreational activities on BLM-administered surface lands and federal mineral estate. These quantitative estimates are used to aid in the analysis of impacts on population.

As indicated in the Economic Conditions section, the BLM does not expect production of trona or locatable or salable minerals to vary by alternative. One implication is that employment opportunities associated with exploration, development, and production of these minerals would not vary by alternative. This does not mean that these employment opportunities are unimportant. While coal production may vary by alternative (since the proposed surface coal mine in the Haystack area could be leased under Alternatives A, C, and D), there are no operations plan production quantity forecasts at this time, which means there is not sufficient information to reliably estimate variations in coal-related employment. Again, this does not imply that employment opportunities associated with the potential Haystack coal mine, or the Kemmerer mine, are unimportant.

In all alternatives, if the pace of development differs from the relatively constant rate assumed in this analysis, there could be short-term impacts on demand for housing and community services and on the supply of tax revenues from residences or businesses to support community services due to short-term changes in job opportunities and the resulting change in in-migration or out-migration. It would likely be more difficult for smaller communities to absorb a sudden influx of new residents or to continue to support existing infrastructure if out-migration suddenly increased. Variances in the actual pace of development and subsequently, production, will also affect local and state revenues tied to mineral and energy resource production.

Finally, in all alternatives, the BLM would continue to consider socioeconomic impacts of site-specific actions and incorporate socioeconomic issues into analyses of environmental, social, and economic impacts, such as the analyses required by NEPA for certain future site-specific actions.

Alternative A

Impacts on Population

In Alternative A, activities on BLM-administered surface land and federal mineral estate related to oil and gas, livestock grazing, and recreation would continue to support an average of 939 to 974 full-time and

part-time jobs per year, which represents about 2 percent of total employment in the planning area as of 2004. It is important to note that this does not constitute an increase of 939 to 974 jobs per year over current employment; it more closely represents an estimate of the contribution of certain activities on BLM-administered surface lands and federal mineral estate to overall employment in the planning area.

As shown in the analysis of impacts on economic conditions, about 60 percent of job opportunities from activities analyzed using the Impact Analysis for Planning (IMPLAN) model would be related to oil and gas development and production. Recreation would contribute about 25 percent of job opportunities, and livestock grazing would contribute about 15 percent. Because recreation and livestock grazing are dispersed over the planning area, and oil and gas development occurs in several different locations in the planning area, the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. However, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston. Some job opportunities related to development of oil and gas resources also may be based outside the planning area, such as in Green River and Rock Springs, due to those areas' roles as an oil and gas service center. Less densely populated towns or unincorporated areas in the planning area could also experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, that small areas may be less able to absorb. Population declines, with the attendant impacts on community social conditions, could also occur in response to slow-downs in the pace of development.

Impacts on Housing and Community Services

Changes in population also could change the demand for housing and community services, such as roads, schools, and police and fire protection. As described in Chapter 3, county-wide vacancy rates in 2000 (the latest year for which county-level data are available) were 23 percent in Lincoln, 11 percent in Sweetwater, and 15 percent in Uinta County. These percentages represent about 1,600 vacant units in Lincoln, 1,800 vacant units in Sweetwater, and 1,200 in Uinta County. County-wide rental vacancy rates in recent years have been somewhat lower (ranging from about one percent to about 13 percent in the summer, and from about one percent to about 17 percent in the winter, depending on the county; see Table 3-38). The annual average number of jobs predicted under this alternative would not result in a substantial impact on the availability of housing (in part because, as noted above, the employment estimate represents the contribution of certain activities on BLM-administered surface and mineral estate to overall employment in the planning area. rather than representing new jobs). As noted in the section on impacts common to all alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It likely would be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services would be similar to those described for the housing stock. Increased job opportunities could support the recent steady population growth, which would lead to increased demand for community services. If national and international energy prices, operator business strategies, or other factors lead to a rapid pace of development, there could be sudden short-term increases in demand for community services because of new jobs and increased population. However, local and state tax revenues collected from energy production could help to mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

Alternative A would maintain existing conditions, let other forces lead changes in the planning area, and allow social conditions to be directed by forces other than a substantive change in BLM management.

Although there are specific interest groups with particular interests regarding specific land uses (e.g., wilderness advocates, oil and gas interests, ranchers), on the whole residents of the planning area tend to support both conservation of natural resources and the economic viability of resource-based industries. For this reason, residents generally support multiple uses of BLM-administered lands, including the development of mineral and energy resources, livestock grazing authorizations, opening of lands to recreation, and conservation of wildlife and native vegetation. This alternative would continue the BLM's current practice of allowing multiple uses. As indicated in the section on impacts common to all alternatives, under this alternative, as under all the alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions.

Alternative B

Impacts on Population

Activities on BLM-administered surface land and federal mineral estate in this alternative related to oil and gas, recreation, and livestock grazing would support an average of 615 to 628 jobs per year, which represents about 1.3 percent of total employment in the planning area as of 2004. Compared to Alternative A, this represents a decrease in employment opportunities amounting to about 0.7 percent of 2004 employment. All the decrease in employment opportunities compared to Alternative A would be in oil and gas; Alternative B would result in a slight increase in livestock grazing-related jobs compared to Alternative A (about five jobs).

The decrease in job opportunities relative to Alternative A could result in a minor decrease in population. The reduction in job opportunities represents 0.7 percent of total 2004 employment; population could drop by a corresponding amount. However, population changes would not necessarily correlate perfectly with changes in employment opportunities, since population levels depend on numerous factors in addition to job opportunities: quality of life, quality of schools and other social services, home affordability, and comparisons relative to other communities, to name a few.

As shown in the analysis of impacts on economic conditions, about 40 percent of the job opportunities from activities analyzed using the IMPLAN model would be related to oil and gas development and production. Recreation would contribute about 40 percent of the job opportunities, and livestock grazing would contribute about 20 percent. Because recreation and livestock grazing are dispersed over the planning area, and oil and gas development occurs in several different locations in the planning area, the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. Despite the overall reduction in oil and gas job opportunities compared to Alternative A, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, which less densely populated towns or unincorporated small areas may be less able to absorb. However, the magnitude of these potential short-term increases would be smaller relative to under Alternative A; in addition, BLM's increased emphasis on collaborative management under this alternative may help to mitigate impacts related to the absorption of new population.

Impacts on Housing and Community Services

Changes in population also could change the demand for housing and community services, such as roads, schools, and police and fire protection, while changes in tax revenues due to mineral production could change the ability of communities to pay for community services. The annual average number of jobs predicted under this alternative may contribute to a slight decrease in demand for housing and community services compared to Alternative A, especially in cities and towns that house or support oil and gas

workers (e.g., Kemmerer and Evanston). As noted in the section on Impacts Common to All Alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It would likely be more difficult for smaller communities to absorb sudden changes of this nature.

Impacts on demand for community services would be similar to those described for the housing stock; that is, there may be a slight decrease in demand for community services compared to Alternative A. In addition, some areas may experience declining tax revenues due to a decrease in oil and gas activity compared to Alternative A, which could affect the communities' abilities to fund and provide community services. If national and international energy prices, operator business strategies, or other factors lead to a rapid pace of development, there could be sudden short-term increases in demand for community services as a result of new jobs and increased population.

Impacts on Custom, Culture, and Social Trends

Alternative B would provide for less economic development than Alternative A, but it would retain natural and rural conditions to a greater degree than Alternative A. Alternative B would indirectly impact the social well-being of communities in the planning area with restrictions on economic development via the use of resources. This alternative would continue BLM's current strategy of allowing multiple uses, but with more emphasis on resource protection.

As indicated in the section on impacts common to all alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions; under Alternative B, the BLM would provide these analyses with the explicit goal of mitigating impacts through collaborative management, where possible. In addition, under this alternative, the BLM would attempt to minimize the conflicts associated with mineral extraction, while stressing a balanced approach to diversify and enhance local economies, such as stressing the development of renewable energy and recreational opportunities. Thus, under this alternative, impacts on custom, culture, and social trends would tend to be reduced compared to Alternative A because of BLM's increased emphasis on collaborative management and the minimization of conflicts associated with mineral extraction.

The prohibition on leasing certain lands for oil and gas development in Alternative B would reduce economic activity attributable to oil and gas development on federal lands. However, the prohibition on leasing certain federal lands may lead indirectly to land use patterns on private and state lands that, in turn, could have secondary effects on custom and culture as related to land use. The development of directional wells from private and state surface land to tap reservoirs that underlie federal surface would be expected to result in an increased number of well pads on the edges of federal surface (but on state and private lands), which could include riparian areas (that otherwise provide excellent wildlife habitat) and large private ranches. While the decision to allow drilling from privately held ranch land may benefit individual operators, it would have effects on the surface landscape that are similar to the effects of development on federal lands (e.g., visual disturbance on otherwise relatively undisturbed expanses of rangeland).

Alternative C

Impacts on Population

Oil, gas, recreation, and livestock grazing activities on BLM-administered surface land and federal mineral estate in this alternative would support an average of 941 to 976 jobs per year, which represents about 2 percent of total employment in the planning area as of 2004. This represents a small increase

compared to Alternative A, amounting to about two jobs—a negligible difference compared to total employment in the three counties (47,000 jobs in 2004). The difference in employment opportunities compared to Alternative A would be in oil and gas; job opportunities in livestock grazing and recreation would be identical to those in Alternative A. There also may be employment opportunities related to the opening of the proposed surface coal mine in the Haystack area. The potential number of jobs related to this proposed mine has not been quantified due to the lack of a reliable forecast for quantity and cost of production.

The relative contributions of oil and gas, recreation, and livestock grazing to job opportunities from activities analyzed using the IMPLAN model would be the same as in Alternative A (60 percent related to oil and gas development and production, 25 percent related to recreation, and 15 percent related to livestock grazing). As in Alternative A, the fact that recreation and livestock grazing, and to some degree oil and gas development, are dispersed over the planning area mean that the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. However, as in Alternative A, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston, and some oil- and gas-related job opportunities may be based outside the planning area. Less densely populated towns or unincorporated areas in the planning area also could experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, that small areas may be less able to absorb.

Impacts on Housing and Community Services

The impacts on housing and community services are expected to be identical to those of Alternative A. As noted in the section on Impacts Common to All Alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It likely would be more difficult for smaller communities to absorb sudden changes of this nature.

If national and international energy prices, operator business strategies, or other factors lead to a short-term increase in the pace of development, there could be short-term increases in demand for community services as a result of new jobs and increased population. However, local and state tax revenues collected from energy production could help to mitigate short-term increases in demand for services, since tax revenues help to pay for community services.

Impacts on Custom, Culture, and Social Trends

The impacts on custom, culture, and social trends associated with Alternative C would be similar to those of Alternative A. Alternative C would indirectly impact the social well-being of communities in the planning area by allowing more economic development via the resource development. This alternative would continue the BLM's current strategy of allowing multiple uses, but with more emphasis on resource development.

As indicated in the section on impacts common to all alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative C, the BLM would provide quantitative analyses that have been developed for proposed site-specific actions without explicit mitigation plans, except for any that are required under NEPA. Under this alternative, impacts on custom, culture, and social trends from future site-specific actions would tend to be similar to those under Alternative A.

Alternative D (Preferred Alternative)

Impacts on Population

Oil, gas, recreation, and livestock grazing activities on BLM-administered surface land and federal mineral estate in this alternative would support an average of 934 to 969 jobs per year, which represents about 2 percent of total employment in the planning area as of 2004. This represents a small decrease compared to Alternative A, amounting to about five jobs – a negligible difference in comparison to total employment in the three counties (47,000 jobs in 2004). The decrease in employment opportunities compared to Alternative A is attributable to oil and gas; job opportunities in livestock grazing and recreation would be slightly higher than in Alternative A (by three jobs and by one job, respectively). As in Alternative C, there also may be employment opportunities related to the opening of the proposed surface coal mine in the Haystack area. The potential number of jobs related to this proposed mine has not been quantified due to the lack of a reliable forecast for quantity and cost of production.

The relative contributions of oil and gas, recreation, and livestock grazing to job opportunities from activities analyzed using the IMPLAN model would be about the same as in Alternative A (60 percent related to oil and gas development and production, 25 percent related to recreation, and 15 percent related to livestock grazing). As in Alternative A, the fact that recreation and livestock grazing and to some degree oil and gas development are dispersed over the planning area mean that the jobs directly and indirectly related to these activities would be somewhat dispersed over the planning area as well. However, as in Alternative A, there likely would be some concentration of job opportunities in population centers, including Kemmerer and Evanston, and some oil- and gas-related job opportunities may be based outside the planning area. Less densely populated towns or unincorporated areas in the planning area also could experience population increases as a result of continued employment opportunities. Depending on the pace of development, which is largely determined by forces other than BLM management actions, there may be short-term increases in population, that small areas may be less able to absorb.

Impacts on Housing and Community Services

As in Alternative A, the annual average number of jobs predicted under this alternative likely would not result in a substantial impact on the availability of housing. As noted in the section on Impacts Common to All Alternatives, if development occurs slower or faster than the relatively steady pace assumed in the analysis, there could be short-term impacts on demand for housing and community services, as well as on the supply of tax revenues from residences or businesses to support community services. It likely would be more difficult for smaller communities to absorb sudden changes of this nature. Impacts on demand for community services would be similar to those described for Alternative A.

Impacts on Custom, Culture, and Social Trends

The impacts on custom, culture, and social trends associated with Alternative D would be similar to those of Alternative A. Alternative D would indirectly impact the social well-being of communities in the planning area to some degree, but would continue BLM's current strategy of allowing multiple uses.

As indicated in the section on impacts common to all alternatives, the BLM would continue to incorporate socioeconomic considerations into the planning process and perform socioeconomic analyses as required for site-specific actions. Under Alternative D, the BLM would provide these analyses with the explicit goal of mitigating impacts through collaborative management, where possible. Also under this alternative, the BLM would attempt to minimize the conflicts associated with mineral extraction, while stressing a balanced approach to diversify and enhance local economies, such as stressing the development of renewable energy and recreational opportunities. Thus, under Alternative D, impacts on custom, culture, and social trends would tend to be reduced compared to Alternative A because of the

BLM's increased emphasis on collaborative management and the minimization of conflicts associated with mineral extraction.

4.8.1.3 Conclusion

Social conditions are related primarily to economic conditions that may influence the growth or development of employment and income. The economic sectors in the planning area that are most likely to be directly affected by BLM management actions are related to the service sector and resource development activities (e.g., oil and gas). That is not to imply that grazing, ranching, and other agricultural activities are unaffected or unimportant. However, based on their economic contribution to the overall economy, changes in this sector would be expected to produce relatively minor economic impacts in the overall economy. Nonetheless, the agricultural sector in this area is quite influential in terms of community character and identity. Thus, land management decisions affecting the agricultural sector could have far reaching impacts on the social structure in the planning area, even though the economic impact is not expected to be substantial.

Table 4-14 provides a summary of impacts on social conditions as discussed in this section for alternatives B, C, and D compared to Alternative A. Although the table attempts to summarize impacts and characterize them as low, medium, or high, it does not classify these impacts as beneficial or adverse. Social impacts seen as beneficial to some interest groups could be seen as adverse to other interest groups. For instance, increased emphasis on resource conservation in Alternative B would result in a change from the current balance of uses, which would likely be seen as a beneficial impact by wilderness advocates, but an adverse impact by oil- and gas-development interests. In the table, high impacts are those that would result in substantial changes to an existing condition that would affect a large number of people and (or) endure for a long time; low impacts are those that would be felt by a limited number of people and for a limited time; and medium impacts are intermediate.

Table 4-14. Overall Impacts on Social Conditions in the Kemmerer Planning Area by Alternative, Compared to Alternative A

Impact	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Estimated Impact on Population	NA	Medium Impact (potential reductions focused in oil/gas service areas)	Low Impact	Low Impact
Estimated Impact on Housing and Community Services	NA	Medium Impact (due to potential population reductions)	Low Impact	Low Impact
Estimated Impact on Custom, Culture, and Social Trends	NA	Low to Medium Impact (change from recent trends would constitute greater emphasis on resource conservation; however, there would be an increased emphasis on collaborative management and mitigating impacts of future site-specific actions)	Low Impact	Low Impact (with increased emphasis on collaborative management and mitigating impacts of future site-specific actions)

Source: Based on the analysis of impacts to social conditions, as described in the text.
NA Not applicable

4.8.2 Economic Conditions

This section addresses the potential for the alternatives to have impacts on economic conditions in the planning area, including direct, indirect, short-term, and long-term impacts. As for the Social Conditions section, this analysis may also provide a suitable starting point for local governments to use in local planning efforts and the BLM anticipates that site specific implementation or project analysis will occur in accordance with governing law and regulations as the RMP allocation decisions are implemented. This analysis process will provide an opportunity for the BLM, State of Wyoming and the affected counties and communities to collaborate in disclosing the socio-economic impacts associated with the site specific action being analyzed. Laws, EOs, regulations, policies, and guidance considered in the analysis of economic conditions are identified in Appendix P.

Potential impacts include changes in regional economic output, employment, and earnings, and in tax revenues for the local, state, and federal governments. In terms of economic modeling analysis, direct and indirect impacts are assumed to occur simultaneously, even though in reality, these impacts may take time to work their way through the economic sectors in the analysis area. For example, an action to permit gas exploration and production may result in the direct infusion of money into several economic sectors and indirect infusions into related sectors. In economic modeling, these impacts would be assumed to occur instantaneously. Moreover, continued direct infusion of money into the planning area's economy created by the decision to lease oil and gas would be analyzed over the life of the project, which in this case, is likely to represent a multiyear period of production. Thus, the analysis is designed to account for the economic activity produced by planning decisions over time. The impacts are estimated on an annual basis through 2020 based on the estimated annual direct impact of the alternatives. For the purpose of this analysis, short-term economic impacts are defined as those that would last for 5 years or less, while long-term economic impacts are defined as those that would last for more than 5 years.

4.8.2.1 Methods and Assumptions

The BLM used the IMPLAN model to estimate economic impacts resulting from BLM management actions under the alternatives. IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the "ripple effect" (or "multiplier effect") of changes in sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly affected) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

For instance, an increase in oil and gas production implies more money would be spent on the maintenance of existing oil and gas equipment and (or) new oil and gas equipment; this, in turn, implies more money would be spent in sectors that provide inputs to oil and gas support services or equipment sectors. These production and consumption or "input-output" relationships allow IMPLAN to estimate the indirect and induced impacts based on changes in production that may result from an alternative. Appendix K provides technical assumptions and additional information about the IMPLAN model.

Assumptions used in this analysis include the following:

- Employment, earnings, and output would continue to be a driver of economic and population growth in the planning area.
- Economic benefits to the planning area would accrue from BLM-influenced activities, such as oil and natural gas development, livestock grazing, and recreation. Economic benefits to the analysis

area also would accrue from wildlife grazing, to the extent that wildlife grazing contributes to the availability of and demand for recreational activities.

- Indirect and induced benefits due to minerals, livestock grazing, and recreation can reasonably be estimated by the IMPLAN model. (The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area.)
- Recreation related expenditures by residents would occur in the region, but would not represent new money coming into the study area. Therefore, the analysis of economic impacts from recreation considers only recreation expenditures of nonresidents of the three-county area. To be more specific, there is a multiplier effect associated with nonresident recreation related spending that injects new money into the study region. By knowing the amount of additional nonresident recreational spending associated with each management alternative, the total economic impact can be estimated.
- The analysis of direct and indirect impacts associated with oil and gas activity considers only activities on BLM-administered surface and federal mineral estate. For the purpose of economic analysis, only costs associated with drilling, completion, and production are included.
- For livestock grazing, the analysis reflects a "worst-case" assumption that all acres affected by surface-disturbing actions (from all the sources listed in Appendix M) would be lands currently authorized for grazing; thus, the number of acres available for grazing in 2020 is the number of acres currently available, minus all acres that would be affected in the long term by surface-disturbing actions. In addition, the analysis of grazing reflects the assumption that surface-disturbing actions would occur at a constant rate over time.

In addition, the analysis reflects two alternative assumptions regarding the expenditures of workers involved in oil and gas drilling and completion activities. These alternative assumptions follow:

- The "high scenario" reflects an assumption that workers involved in oil and gas drilling and completion reside within the socioeconomic study area (i.e., Lincoln, Sweetwater, and Uinta counties) and, therefore, spend most or all of their earnings in the socioeconomic study area.
- The "low scenario" reflects an assumption that workers involved in oil and gas drilling and completion spend none of their earnings in the socioeconomic study area.

The pace and timing of future mineral and energy resource development in the planning area will depend on many factors beyond the management actions of the BLM. These include national and international energy demand, supply, and prices; operator business strategies; production conditions within the planning area; and demand and supply for agricultural products. History and reason suggest that future development will likely vary over time, potentially quite dramatically. However, because of the uncertainty in projecting the pace and timing of future development, the assessment of social and economic consequences is based on a relatively constant level of development over time. That assumption results in the portrayal of average changes or impacts over time, even though those specific changes may not actually occur or be observed. Actual social and economic impacts would depend on changes in the rate of development, and include the potential for adverse impacts associated with boom and bust cycles.

The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the planning area. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the planning area compared to a model using unadjusted national coefficients. Specifically, worker productivity in oil and gas production is higher in Wyoming than nationally, and more of the hay used for livestock feed is

produced within the region compared with national averages. Key variables used in the IMPLAN model were filled in using data specific to Wyoming, including employment estimates, labor earnings, and total industry output (Taylor 2004).

4.8.2.2 Analysis of Alternatives

Impacts Common to All Alternatives

The focus of the following analysis is on the resource activities most likely to be affected by land management decisions, including oil, gas, livestock grazing, and recreation (including OHV use). Actions from resource programs or constraints (as described in the alternatives) that impact oil, gas, livestock grazing, OHV, and recreation (e.g., surface-disturbing actions that affect the amount of land available for grazing) are included by implication. Also included by implication are restrictions on ROW and corridors and the BLM's Reasonable Foreseeable Development Scenario for oil and gas, which provides estimated numbers of oil and gas wells and production, and incorporates the restrictions on ROW and corridors. Restrictions on new ROW would tend to be a negligible factor in the decision to develop additional oil and gas wells in fields that are already producing, but could be an important factor in a decision to develop a new field.

Economic impacts related to other resources, such as coal, trona, and renewable energy development, are addressed outside the framework of the IMPLAN model. For instance, while coal production may vary by alternative (since the proposed surface coal mine in the Haystack area could be leased under alternatives C and D), there are no production quantity forecasts at this time, which means there is not sufficient information to reliably estimate data needed to estimate direct employment, or to run the IMPLAN model to estimate indirect or induced employment. For locatable and salable minerals, the BLM generally expects to meet market demand and process claims and applications so that the production of these minerals would not vary across the alternatives being considered. The BLM also does not expect the alternatives to affect the quantity of trona produced; the amount of trona mined and processed in the planning area may vary depending on market conditions or other non-BLM actions, but would not differ across the alternatives. Thus, the sections below on effects under each alternative do not include earnings, jobs, or output related to trona production; however, this does not mean trona production is unimportant (e.g., see Economic Conditions in Chapter 3 for information on current employment and payroll from trona mining and processing operations). For more information on minerals, refer to the Mineral Resources sections.

The primary driver of wind-energy development will be market forces, including prices for nonwind energy sources, as well as other factors. BLM decisions regarding management of BLM-administered land will have some impact with respect to economic opportunities related to wind-energy development (e.g., some restrictions on land that can be developed for wind energy under Alternative B), but these impacts will be small relative to overall market conditions. The Renewable Energy section reports on the impacts of BLM decisions with respect to development of wind-energy sources.

Changes in economic activity have impacts on federal, state, and local tax revenues. While all sectors of the economy contribute to tax revenues, the analysis of tax revenue impacts focuses on oil and gas production because almost all of the variation in economic activity across the alternatives is in the oil and gas sector.

The focus of the analysis is on regional earnings and output, employment, and tax revenue, with the region defined as the three-county planning area. Because the exact locations of additional well drilling and certain other surface-disturbing activities are not known at this time, it is difficult to predict impacts on specific grazing allotments or other specific parcels within the planning area. In the case of grazing allotments, the impacts of surface-disturbing actions are expected to occur over a relatively long time (20

years). Coupled with the relatively small impacts on grazing estimated to occur for all alternatives (as described for individual alternatives below), the implication is that impacts on individual allotments are likely to be minor. In certain cases the impacts may be greater and would be reviewed on a project specific basis.

Alternative A

Impacts on Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative A would average between $27.9 and $28.7 million per year between 2001 and 2020 and regional output would average between $382.3 and $384.0 million per year due to activities on BLM-administered surface lands and federal mineral estate. The net present value of the stream of regional output, discounted at a 7-percent real discount rate (OMB 2002), would be between $3,379 and $3,405 million over 20 years. (As described in the Methods and Assumptions section, the range of impacts reflects alternative scenarios regarding how much of the earnings of oil and gas drilling and completion workers would spend within the three-county area.) Table 4-15 shows sector-level breakouts for earnings and output.

Table 4-15. Average Annual Impacts on Earnings and Output by Sector and Alternative for the Kemmerer Planning Area

Sector	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Impacts on Annual Average Earnings (millions of 2004 $)				
Oil and Gas[1]	$22.1 - $22.8	$9.5 - $9.8	$22.2 - $22.9	$21.7 - $22.5
Livestock Grazing	$2.6	$2.6	$2.6	$2.6
Recreation	$3.3	$3.3	$3.3	$3.3
Total[1]	$27.9 - $28.7	$15.4 - $15.7	$28.0 - $28.8	$27.7 - $28.4
Impacts on Annual Average Output (millions of 2004 $)				
Oil and Gas[1]	$363.1 - $365.7	$188.0 - $188.9	$364.2 - $366.8	$359.6 - $362.1
Livestock Grazing	$8.3	$8.6	$8.3	$8.5
Recreation	$10.9	$10.9	$10.9	$11.0
Total[1]	$382.3 - $384.9	$207.6 - $208.5	$383.4 - $386.0	$379.1 - $381.6
Impacts on Net Present Value of Output over 20 Years (millions of 2004 $)[2]				
Oil and Gas[1]	$3,177 - $3,203	$1,646 – $1,655	$3,187 - $3,213	$3,146 - $3,171
Livestock Grazing	$89	$92	$89	$91
Recreation	$113	$113	$113	$113
Total[1]	$3,379 - $3,405	$1,850 - $1,859	$3,388 - $3,415	$3,350 - $3,375

Source: Calculated using the IMPLAN model, as described in the text.

[1]The range of estimated impacts represents the high and low scenarios for oil and gas drilling and completion, which are described in the text. The high scenario reflects an assumption that workers involved in oil and gas drilling and completion spend most or all of their earnings in the three-county area, while the low scenario reflects an assumption that these workers spend none of their earnings in the three-county area.

[2]Net present value from 2001 to 2020, discounted at 7 percent (rate from OMB 2002).

IMPLAN Impact Analysis for Planning model

Impacts on Employment

From a methods standpoint, employment impacts should not be considered separately from output impacts, for there is a close relationship between the two. Employment can be thought of as a function of the level of economic activity (sales and purchases) among and between sectors.

Based on the IMPLAN model, regional employment under Alternative A would average between 939 and 974 jobs per year[1] between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate. Table 4-16 provides information on how these jobs break out by sector.

Average annual earnings per job would differ for each of these sectors. Based on the IMPLAN model, earnings per job (expressed in year 2004 dollars) would average as follows:

- Between $36,107 and $37,758 for jobs in oil and gas well drilling and between $34,603 and $35,309 for jobs in well completion.
- $40,238 for jobs in oil and gas production.
- $26,626 for jobs associated with cattle grazing and $12,341 for jobs associated with sheep grazing.
- Between $12,950 and $16,125 for recreation-related jobs.

Table 4-16. Average Annual Impacts on Employment by Sector and Alternative for the Kemmerer Planning Area

Sector	Number of Jobs[1]			
	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Oil and Gas	574 - 610	–246 – 258	576 - 612	565 - 600
Livestock Grazing	127	132	127	130
Recreation	238	238	238	239
Total	939 - 974	–615 – 628	941 - 976	934 - 969

Source: Calculated using the IMPLAN model, as described in the text.

[1] Number of jobs is in annual job equivalents (AJE), where one AJE represents 12 months of employment. For instance, one AJE could represent one job for 12 months or two jobs for 6 months.

The range of estimated impacts represents the high and low scenarios for oil and gas drilling and completion, which are described in the text. The high scenario reflects an assumption that workers involved in oil and gas drilling and completion spend most or all of their earnings in the three-county area, while the low scenario reflects an assumption that these workers spend none of their earnings in the three-county area.

IMPLAN Impact Analysis for Planning model

Impacts on Tax Revenue

Projected tax revenues for Alternative A due to oil and gas production on federal minerals would average $32.2 million per year for federal royalties, $15.5 million per year for state severance taxes, and $16.2 million per year for local ad *valorem* taxes. The distribution of these revenues is not under the control of the Kemmerer Field Office. Also, these numbers can change due to legislation at the federal and state levels. Because specific well locations are not known at this time, there are no sufficient data to apportion the local tax receipts to individual counties. Table 4-17 provides a summary of tax revenues from oil and gas production for the alternatives.

[1] The number of jobs is expressed as "annual job equivalents," where one annual job equivalent (AJE) represents 12 months of employment. For example, one AJE could represent 2 jobs for six months each, or one job for 12 months. AJEs may represent either full-time or part-time jobs.

Table 4-17. Estimated Oil and Gas Tax Revenues by Alternative for the Kemmerer Planning Area (millions of 2004 $)

Tax Type	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Federal mineral royalties	$32.2	$17.5	$32.3	$31.9
State severance taxes	$15.5	$8.4	$15.5	$15.3
Local *ad valorem* production taxes	$16.2	$8.8	$16.3	$16.1
Total	$63.9	$34.7	$64.1	$63.4

Source: Calculated based on projected production, state, federal, and local tax rates, and assumed values.
IMPLAN Impact Analysis for Planning model

Alternative B

Impacts on Regional Earnings and Output

Based on the IMPLAN model, regional earnings under Alternative B would average between $15.4 and $15.7 million per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate. Although regional earnings under Alternative B amount to just over half the amount projected for Alternative A based on the activities analyzed in IMPLAN, the difference (about $13 million per year) amounts to less than 0.6 percent of 2004 total personal income in the three-county socioeconomic study area; thus, the difference between alternatives A and B amounts to a relatively small portion of total earnings. As Table 4-15 shows, the difference between the alternatives is due entirely to the difference in oil and gas activity; earnings from recreation and livestock grazing are identical (to one decimal point). Regional output would average between $207.6 and $208.5 million per year, with a net present value of between $1,850 and $1,859 million (Table 4-15).

Alternative B would be more restrictive in terms of allowing renewable energy development compared to Alternative A. However, the amount of wind-energy development in any alternative would mainly be influenced by market conditions and development potential relative to other areas and, therefore, cannot be predicted quantitatively at this time.

Under Alternative B, the Bear River Divide MA would severely constrain a proposed building stone operation. The operation has been proposed and has staked a mining claim, but there is not yet a plan of operations. Economic impacts would be minimal (i.e., the plant will likely employ two or three people within the planning area and the product would likely be sold outside the planning area).

Impacts on Employment

Regional employment under Alternative B would average between 615 and 628 jobs per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate analyzed in the IMPLAN model. Although this number of jobs is only about two-thirds the level predicted for Alternative A (Table 4-16), the difference amounts to just 0.7 percent of the total employment in the three-county area in 2004 (47,414 jobs). Average annual earnings per job in Alternative B would be identical to those shown for Alternative A.

Impacts on Tax Revenue

Projected tax revenues from oil and gas production would average $17.5 million per year for federal royalties, $8.4 million per year for state severance taxes, and $8.8 million per year for local ad valorem tax receipts (Table 4-17). These figures represent a decrease of about 46 percent compared to Alternative A.

Alternative C

Impacts on Regional Earnings and Output

Regional earnings under Alternative C would average between $28.0 and $28.8 million between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate analyzed in IMPLAN – slightly more than the amount projected for Alternative A. As Table 4-15 shows, the difference in earnings compared to Alternative A is due to a small difference in oil and gas activity projected in Alternative C; earnings due to livestock grazing and recreation are identical. Regional output would average between $383.4 and $386.0 million per year, with a net present value of between $3,388 and $3,415 million over 20 years due to activities on BLM-administered surface lands and federal mineral estate (Table 4-15).

Under Alternative C, the area of the proposed Haystack site would be open for potential development of a coal mine. Additional jobs would be at this mine, assuming it were to open. However, the mine opening is relatively far off (current information suggests that mining may occur approximately 10 years after RMP approval), and there are no plan for operations or forecasts for production quantity at this time. Thus, the number of jobs and impacts on earnings are difficult to forecast.

Impacts on Employment

Regional employment would average between 941 and 976 jobs per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate (Table 4-16). This is slightly higher than for Alternative A – higher by just two jobs, which is a tiny percentage of the 47,414 jobs in the three-county area as of 2004. Average annual earnings per job would be identical to those shown for Alternative A.

Impacts on Tax Revenue

Projected tax revenues from oil and gas production would be about the same as under Alternative A: $32.3 million per year for federal royalties, $15.5 million per year for state severance taxes, and $16.3 million per year for local ad valorem tax receipts (Table 4-17).

Alternative D (Preferred Alternative)

Impacts on Regional Earnings and Output

Regional earnings under Alternative D would average between $27.7 and $28.4 million between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate – slightly less than for Alternative A. As with the other alternatives, the difference in regional earnings is driven by changes in oil and gas activity (Table 4-15).

Regional output would average between $379.1 and $381.6 million per year due to activities on BLM-administered surface lands and federal mineral estate. The net present value of the stream of output would be between $3,350 and $3,375 million over 20 years (Table 4-15).

Under Alternative D, similar to Alternative C, the area of the proposed Haystack site would be open for potential development of a coal mine. Additional jobs would be at this mine assuming it were to open. However, the mine opening is relatively far off (current information suggests that mining may occur approximately 10 years after RMP approval), and there are no plan for operations or forecasts for production quantity at this time. Thus, the number of jobs and impacts on earnings are difficult to forecast.

Under Alternative D, the Bear River Divide MA would allow mineral material sales and (or) free use permits, therefore the establishment of this MA would not constrain a proposed building stone operation. The operation has been proposed and has staked a mining claim, but there is not yet a plan of operations. Economic impacts would be minimal (i.e., the plant will likely employ two or three people within the planning area and the product would likely be sold outside the planning area).

Impacts on Employment

Regional employment would average between 934 and 969 jobs per year between 2001 and 2020 due to activities on BLM-administered surface lands and federal mineral estate, which is slightly less than the level predicted for Alternative A (Table 4-16); the difference compared to Alternative A, five jobs, is not substantial in comparison to the total number of jobs in the three-county area in 2004 (47,414). Average annual earnings per job would be identical to those shown for Alternative A.

Impacts on Tax Revenue

Based on the analysis, projected tax revenues would average $31.9 million per year for federal royalties, $15.3 million per year for state severance taxes, and $16.1 million per year for local ad valorem tax receipts (Table 4-17). These figures represent a small decrease (about 0.8 percent) compared to Alternative A.

4.8.2.3 Conclusion

Overall, earnings, output, employment, and tax revenues due to activities on BLM-administered land and mineral estate would be nearly identical among alternatives A, C, and D. Earnings, output, employment, and tax revenues would be lower under Alternative B. Differences in projected oil and gas activity are the primary reason for overall differences in these economic measures in Alternative B.

The difference in earnings projected to result from the different alternatives represents a small proportion of total earnings in the socioeconomic analysis area in 2004. This is quite clear in comparing alternatives A, C, and D: earnings in Alternative C are higher than in Alternative A, but only by $0.1 million per year, and earnings in Alternative D are lower than in Alternative A by just $0.3 million per year (based on the high scenario, in which oil and gas drilling and completion workers spend most or all of their earnings in the three-county area; the differences are comparable for the low scenario). For Alternative B, earnings are lower than in Alternative A by $13.0 million per year (in the high scenario), but this still amounts to less than 0.6 percent of the total personal income in the three-county area in 2004, which was $2,318 million.

Similarly, differences in employment across the alternatives represent a small proportion of total employment in the three-county area in 2004. Total employment was 47,414 jobs in 2004, and even the largest difference in alternatives (the difference of 347 jobs between alternatives A and B) represents a relatively small proportion of that number. Thus, although BLM management decisions affect the local economy, other activities not on BLM-administered surface land and federal mineral estate also have substantial influence on regional earnings, output, employment, and tax revenues.

4.8.3 Health and Safety

Health and safety, as discussed in this document, includes landslides, Abandoned Mine Lands (AML), and hazardous materials and wastes (hazardous materials). Each of these hazards is analyzed below in a separate section.

Health and Safety – Landslides

4.8.3.1 Methods and Assumptions

The methods and assumptions used in this impact analysis include the following:

- Surface disturbance on unstable slopes could cause changes in moisture content and weight distribution, which could result in landslides.
- The USGS and WSGS have mapped and identified landslide prone areas.

4.8.3.2 Analysis of Alternatives

Impacts Common to All Alternatives

Activities in known landslide prone areas are restricted on the public surface or federal mineral estate. The BLM addresses the management challenges associated with landslides via the environmental analysis process for individual project proposals. When appropriate, the Kemmerer Field Office develops mitigation measures to avoid and minimize impacts associated with landslides.

4.8.3.3 Conclusion

Under all alternatives, the risks from landslides are addressed at the site specific level. Therefore, no differences in impacts to landslides would occur among the alternatives.

Health and Safety – Abandoned Mine Lands

To reduce the threat of physical and environmental impacts from AML sites, the Kemmerer Field Office will remediate sites based on risk.

4.8.3.4 Methods and Assumptions

The methods and assumptions used in this impact analysis include the following:

- Most AML sites in the planning area are identified and characterized.
- "The BLM will set as its highest AML physical safety action priority the cleaning up of those AML sites situated at locations: (a) where a death or injury has occurred and the site has not already been addressed; or (b) situated on or in immediate with high visitor use" (BLM 2000c). Under the Clean Water Action Plan, AML sites adversely impacting watersheds also are a high priority. The BLM continues to support the Wyoming DEQ AML Division (DEQAML) in reclaiming AML sites on public surface.

4.8.3.5 Analysis of Alternatives

Impacts Common to All Alternatives

The alternatives described in Chapter 2 are not expected to create new AML sites or increase risks at AML sites.

In cooperation with the DEQAML, the BLM will remediate AML sites posing a substantial risk to human health and the environment. Risk reduction also will occur through educating the public about the

hazards associated with abandoned mines using publications, signage, websites, and other educational materials.

An active reclamation program would be established to incorporate cleanup and reduction of hazards and will remain in place for all alternatives. Adverse impacts may result if AML sites located within or adjacent to the Raymond Mountain WSA cannot be accessed for reclamation.

4.8.3.6 Conclusion

No differences in impacts to AML sites occur among the alternatives. An active reclamation program is established to incorporate cleanup and reduction of hazards and will remain in place for all alternatives.

Health and Safety – Hazardous Materials and Waste

With increased recreational and commercial use of public surface in the planning area comes an inherent risk associated with an increase in the amount of hazardous materials generated, used, transported, and stored.

4.8.3.7 Methods and Assumptions

Methods and assumptions used in this impact analysis include the following:

- All new hazardous materials and waste sites are identified and characterized.
- Resource development activities identify any possible generation of hazardous waste.
- No substantial new hazardous materials uses and (or) waste generation occurs within the planning area.
- The BLM's Hazard Management and Resource Restoration Program (HMRRP) will respond to hazardous substance releases in accordance with procedures outlined in the National Contingency Plan (40 CFR, Part 300). Emergency cleanup actions are implemented on sites posing a substantial threat to the public and (or) the environment.

4.8.3.8 Analysis of Alternatives

Impacts Common to All Alternatives

Implementing hazardous materials management activities will address human health and environmental risks from potential hazardous materials release or exposures. Any authorized use of hazardous materials adheres to federal and state requirements to reduce or eliminate impacts. Hazardous materials in the planning area are managed to reduce risks to visitors and employees, to restore contaminated lands, and to carry out emergency response activities, as per appropriate laws, policies, and regulations. An active response program remains in place under all alternatives. Indirect impacts related to risks from hazardous materials during remediation could exist.

Alternative A

Under Alternative A, activities will comply with the requirements of Onshore Order #6 for H_2S plans. Alternative A reduces the risk to humans and the environment from hazardous materials and waste in the planning area.

Alternative B

Under Alternative B, new H_2S wells will be prohibited within 2 miles of towns, cities, and designated campgrounds. Alternative B is the most restrictive for H_2S well placement and development; however, this alternative reduces risks to humans and the environment more than other alternatives.

Alternative C

Under Alternative C, H_2S requirements are the same as for Alternative A; therefore, impacts are expected to be similar.

Alternative D (Proposed RMP)

Alternative D also has the same H_2S requirements as Alternative A; therefore, impacts are expected to be similar.

4.8.3.9 Conclusion

Under all alternatives, the risks from hazardous materials and waste are managed to reduce risk to people and the environment as discussed in Methods and Assumptions and as per HMRRP. An active response program remains in place under all alternatives. Alternatives A, C, and D are identical to each other with regard to new H_2S wells, but less restrictive than Alternative B. Therefore, alternatives A, C, and D may pose a slightly greater risk to the health and safety of towns, cities, and campgrounds than management actions under Alternative B.

4.8.4 Environmental Justice

This section addresses the potential for the alternatives to have disproportionate adverse impacts on minority and low-income populations, including direct, indirect, short-term, and long-term impacts. Because the analysis of disproportionate adverse impacts depends on what impacts are identified related to other resources, definitions of adverse impacts as they apply to environmental justice issues are closely related to the definitions of adverse impacts in other resource areas (e.g., social resources). For example, the displacement of a mobile home park that houses a low-income population to build a new road could be a disproportionate direct impact. An example of a disproportionate indirect impact could be a reduction in social services to low-income individuals that may result from decreased tax revenues because of decreased mineral production.

4.8.4.1 Methods and Assumptions

Since the analysis of disproportionate adverse impacts is based on other resource impacts, the assumptions for this analysis also are based on the assumptions of other resource areas as they relate to the identification and analysis of impacts. In addition, this analysis assumes that if demographic data show that there are concentrations of minority and low-income populations in the planning area, then the adverse impacts on other resources would need to be identified and evaluated to determine if there would potentially be disproportionate adverse impacts.

In accordance with BLM and Council on Environmental Quality (CEQ) guidance for assessing environmental justice in the planning process, an area would be considered to contain a minority population if either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population. Since the minority population in each of the counties that overlap the planning area is lower than the statewide minority population, and the minority population in each of the counties does not exceed 50 percent, none of these areas is considered to contain a resident minority population. Based on the BLM and CEQ guidance relating to identifying low-income populations, there also are no low-income populations living in poverty in the planning area.

Although there are no Native American reservations in the planning area, the Wind River Indian Reservation is about 60 miles east of the eastern boundary of the planning area. The Cultural Resources section of this document addresses the cultural significance of sites in the planning area to members of tribes living in and near the planning area.

4.8.4.2 Analysis of Alternatives

Based on the definitions, methods, and assumptions described above, the potential impacts of the alternatives are described below.

Impacts Common to All Alternatives

Based on demographic conditions in the planning area and the direct and indirect impacts of the alternatives, there would be no identifiable environmental justice issues or direct or indirect impacts associated with any of the alternatives specific to any minority or low-income community or population as defined in Executive Order (EO) 12898 or BLM IM 2002-164 (BLM 2002f). While minority and low-income populations exist in the planning area, no particular BLM actions proposed in any of the alternatives have been identified as causing disproportionate adverse impacts on these populations. The BLM has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.8.4.3 Conclusion

The alternatives would be identical with respect to potential impacts on minority and low income populations. No particular BLM actions proposed in any of the alternatives would potentially cause disproportionate adverse impacts on minority or low-income populations. The BLM has considered all input from persons regardless of their race, ethnicity, income status, or other social and economic characteristics.

4.9 Cumulative Impacts

The CEQ defines cumulative effects as follows:

> *The impact on the environment which 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 (40 CFR 1508.7).*

The following narrative describes the three components of this definition as they relate to this cumulative impact analysis: (1) incremental impact of the action when added to (2) impacts from all past, present, and (3) reasonably foreseeable future actions.

The first component, incremental impacts of the action (i.e., RMP revision), is described for each resource under the eight resource topics in Sections 4.1 to 4.8 as direct, indirect, short-term, and long-term. The second component, impacts from all past and present actions, is encompassed within the description of baseline conditions presented in Chapter 3 – Affected Environment. In other words, the description of the current affected environment reflects past and present actions. The third component, reasonably foreseeable future actions are identified in Table 4-18 and in Appendix M.

Table 4-18. Summary of Reasonable Foreseeable Future Actions and Management Plans*

Reasonable Foreseeable Future Actions and Management Plans	Programmatic Project
BLM Pinedale Field Office Resource Management Plan (1988a)	Yes
BLM Green River Resource Management Plan (1997a)	Yes
BLM Salt Lake Field Office Resource Management Plan	Yes
BLM Pocatello Field Office Resource Management Plan (BLM 1987)	Yes
Final Programmatic EIS on Wind Energy Development on BLM-Administered Lands in the Western United States (BLM 2005b)	Yes
BLM Instruction Memorandum 2001-102, Grasshopper and Mormon Cricket Control Program Changes (BLM 2001e)	Yes
Bridger-Teton National Forest Land and Resource Management Plan (USFS 1990)	Yes
Wasatch-Cache National Forest Land and Resource Management Plan (USFS 2003)	Yes
Lincoln County Comprehensive Plan. Lincoln County Commissioners (2005)	Yes
Uinta County Comprehensive Plan. Uinta County Commissioners (2004)	Yes
Sweetwater County Comprehensive Plan. Sweetwater County Commissioners (2002)	Yes
Wyoming Department of Transportation Fiscal Year 2005 State Transportation Improvement Summary (WYDOT 2004)	Yes

Note: Full citations for each project are in Chapter 5 – References.
BLM Bureau of Land Management
EIS Environmental Impact Statement
USFS U.S. Forest Service
WYDOT Wyoming Department of Transportation
*The BLM Moxa Arch Area Infill Gas Development Project EIS, the West-wide Energy Corridor Programmatic EIS, the Oil Shale and Tar Sands Leasing Programmatic EIS, and other regional planning documents that are ongoing, but not finalized are not included in this table.

Table 4-18 identifies 13 projects anticipated to involve reasonably foreseeable future actions in or adjacent to the planning area. Twelve of the projects in Table 4-18 are land use plans or other types of programmatic documents that provide a framework for subsequent site-specific actions. The breakdown of these 13 projects by agency includes 4 BLM RMPs, 1 BLM Programmatic Wind-Energy EIS, 2 U.S. Forest Service (USFS) Land and Resource Management Plans, 3 County Land Use Plans, and 1 Wyoming State Transportation Plan. The remaining 2 projects include 1 site-specific project and 1 BLM IM.

The analysis of cumulative impacts serves to place the projected incremental impacts from the RMP alternatives in the context of past, present, and future impacts. Combining the projected impacts of RMP alternatives with past, present, and future impacts necessarily involves projections and limited analyses. Analyses are limited primarily due to incomplete documentation of all past and present impacts on private and public lands; challenges of predicting potential impacts for reasonably foreseeable future actions; programmatic and strategic nature of RMP alternatives; unknown nature and pace of resource uses and technological changes that could occur; and changing circumstances related to agency priorities, policies, and the economy. These limitations are addressed through the methods and assumptions described in the following section.

4.9.1 Methods and Assumptions

It is neither practical nor required to exhaustively analyze all possible cumulative impacts. Instead, CEQ (2005) indicates the cumulative impact analysis should focus on meaningful impacts. The BLM identified key planning issues (see Chapter 1) to focus the analysis of environmental consequences in Sections 4.1 to 4.8 on meaningful impacts. During the analysis of environmental consequences, the key planning issues were further refined to seven cumulative issues for discussion in this section. Cumulative issues were identified based on scoping input, reasonably foreseeable future actions, professional judgment, purpose and need of the action, planning criteria, and consideration of context and intensity of potential impacts. Particular attention was given to potential impacts to public health and safety, controversy, uniqueness of resources, potential for violation of legal standards or laws, and potential impacts to legally protected resources. To focus the scope of cumulative impact analyses, cumulative issues were considered in the context of baseline conditions (Chapter 3), the incremental impacts of individual resources (Sections 4.1 to 4.8), reasonably foreseeable future projects in Table 4-18, and the following factors (as modified from CEQ 1997):

- Does the impacted resource have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance?
- Are reasonably foreseeable future actions anticipated to have environmental impacts similar to the incremental impacts identified for RMP alternatives?
- Have any recent or ongoing NEPA analyses of similar actions in the geographic area identified important adverse or beneficial cumulative impact issues?
- Has the impact to the resource been historically significant, such that the importance of the resource is defined by past loss, past gain, or investments to restore resources?

The cumulative impact analysis was further bounded by timeframe, geographic area, and analytical assumptions. The timeframe or temporal limits of the cumulative impact analysis was defined as the anticipated life of the RMP. This timeframe corresponds to projections for the desired outcomes (goals and objectives) described for alternatives (Chapter 2). The geographic area or spatial limits of the cumulative impacts analysis was generally defined as the planning area; however, the impact analysis area was expanded for highly mobile resources, such as air quality, and for future actions adjacent to the planning area anticipated to have similar environmental impacts.

The majority of projects identified in Table 4-18 is ongoing and generally provide a management framework for site-specific actions implemented during the life of the various projects. Site-specific actions that have already occurred (past) or are ongoing (present) are not considered in this cumulative impacts analysis. Instead, these past and present actions are described in the baseline described in Chapter 3 – Affected Environment. Only those reasonably foreseeable future actions stemming from the 13 projects identified in Table 4-18 and Appendix M are considered in this cumulative impacts analysis (CEQ 2005).

Because most of the projects identified in Table 4-18 are programmatic and (or) strategic in nature, the precise intensity or location of anticipated impacts typically cannot be quantified. Therefore, the projects in Table 4-18 are primarily used to address the four factors identified above. For more quantitative analysis, the BLM projected the anticipated surface disturbance and air emissions from non-BLM RFAs for the entire planning area (Appendix M). The estimates of RFAs in Appendix M are based on historic and trend information, as well as the proportion of public to nonpublic land in the planning area. In addition to estimating RFAs for BLM and non-BLM actions, Appendix M also projects surface disturbance as short-term and long-term. Long-term surface disturbance denotes the disturbed area remaining following reclamation. Table 4-19 summarizes projected surface disturbance for BLM and non-BLM RFAs identified in Appendix M.

Table 4-19. Cumulative Surface Disturbance (Acres) from BLM and Non-BLM Reasonable Foreseeable Actions over the Life of the Plan in the Kemmerer Planning Area

Action	Alternative A	Alternative B	Alternative C	Alternative D *(Proposed RMP)*
Total Acres Short-Term Disturbance from BLM Actions	214,120	104,338	174,967	147,262
Total Acres Reclaimed from BLM Actions	69,447	57,106	30,500	69,721
Total Acres Long-Term Disturbance from BLM Actions	**144,673**	**47,232**	**144,467**	**77,541**
Total Acres Short-Term Disturbance from Non-BLM Actions	185,498	185,498	185,898	185,898
Total Acres Reclaimed from Non-BLM Actions	32,618	32,618	32,818	32,818
Total Acres Long-Term Disturbance from Non-BLM Actions	**152,880**	**152,880**	**153,080**	**153,080**
Cumulative Long-Term Disturbance from BLM and Non-BLM Actions	**297,553**	**200,112**	**297,547**	**230,621**

Source: Appendix M of this document, Table M-1
BLM Bureau of Land Management

In general, trend analysis was used to assess cumulative impacts for identified issues in terms of ranges or changes in direction from baseline conditions. In lieu of quantitative data, projections regarding resource values were made when necessary.

Because BLM does not manage or regulate non-BLM actions, certain assumptions were made in estimating cumulative impacts for non-BLM actions. Assumptions used in calculating impacts from non-BLM actions within the planning area follow.

1. For cumulative impacts associated with non-BLM oil and gas activities, calculations were based on the following percent federal and non-federal wells from the Kemmerer Oil and Gas Reasonable Foreseeable Development (BLM 2006b; BLM 2008a):

   - Baseline – 46 percent federal and 54 percent nonfederal
   - Alternative A – 41 percent federal and 59 percent nonfederal
   - Alternative B – 26 percent federal and 74 percent nonfederal
   - Alternative C – 41 percent federal and 59 percent nonfederal
   - Alternative D – 41 percent federal and 59 percent nonfederal

2. For cumulative impacts associated with non-BLM other activities (excluding oil, gas, and coal) the amount and density of activities was assumed the same for BLM and non-BLM actions, regardless of land ownership. The calculation of cumulative impacts for non-BLM other mineral actions (i.e., non-oil and gas) is based on 40-percent BLM-minerals and 60-percent non-BLM minerals in the planning area. The calculation of cumulative impacts for non-BLM other activities (i.e., nonmineral) is based on 36-percent BLM-administered surface and 64-percent non-BLM-administered surface in the planning area.

3. For cumulative air quality impacts associated with non-BLM trona processing, calculations were based on actual emissions from the five trona processing facilities in the planning area for 2001 (Bott 2006).
4. The context and intensity of non-BLM activities are not anticipated to vary by alternative because these activities do not directly depend on management actions and allowable uses set forth in RMP alternatives.

Cumulative Impacts

Review of the EISs or associated plans for the 13 projects in Table 4-18 reveal that most reasonably foreseeable future actions from the projects could be expected to produce environmental impacts similar to the incremental impacts anticipated for the RMP alternatives. For example, when implemented, most projects in Table 4-18 are anticipated to involve surface-disturbing activities or will allow removal of vegetation and soil disturbance, similar to actions anticipated for RMP alternatives. Therefore, cumulative impacts such as soil erosion, spread of INNS, and habitat fragmentation are anticipated to be commensurate with the amount of surface disturbance projected within the planning area.

Some resources (i.e., cultural, special status species, air quality) that could be impacted by reasonably foreseeable future actions have substantial value relative to legal protection and (or) ecological, cultural, economic, or social importance. Exceedance of legal standards or thresholds protecting these resources is not anticipated from the cumulative impact of BLM and non-BLM actions; however, the programmatic nature of most RFAs prohibits precise prediction of cumulative impacts. Subsequent environmental impact analyses during implementation of management plans identified in Table 4-18 will include more precise site- and project-specific information.

The following cumulative impacts discussion is organized according to the seven cumulative issues identified during scoping to focus the cumulative impact analysis. Each issue is discussed in terms of the potential cumulative impact of BLM actions anticipated through implementing the revised plan and non-BLM actions anticipated to occur during the life of the plan.

Cumulative Issue 1 – The cumulative impact of surface-disturbing activities and the associated potential invasion and spread of INNS

The INNS section in this chapter describes how surface-disturbing activities and the disturbance of soil contribute to the spread of INNS. The Soil section describes potential impacts to soil from surface-disturbing activities and other activities that remove vegetation and disturb soil. RFAs that disturb soil are also anticipated to create potential habitats for INNS. In general, the more soil disturbed over the life of the plan, the greater the cumulative impact anticipated relative to INNS. While much of the area projected to be disturbed from BLM and non-BLM actions is anticipated to be reclaimed, the potential for the spread of INNS remains from both short- and long-term impacts (Table 4-19).

In addition to total acres of land disturbed, the type of disturbance is important to the spread of INNS. For example, construction, maintenance, existence, and operation of linear features (e.g., water courses, roads, trails, ROWs, and corridors) in the planning area could have a substantive impact on the spread of INNS. Water, wind, vehicles, livestock, humans, and wildlife inadvertently transport INNS along these linear features. Similar to surface disturbance, the greater the miles of linear features constructed, the greater the adverse cumulative impact from INNS.

Surface-disturbing activities are defined as the physical disturbance and movement or removal of the land surface and vegetation (see Glossary). In addition to surface-disturbing activities other surface-use activities may remove vegetation and disturb soil. OHV use, fire suppression, recreational activities, and dispersed travel may remove vegetation and disturb the soil surface. Improper grazing by livestock and native ungulates can reduce vegetative cover, exposing more soil to erosion. Surface-disturbing activities and surface uses can contribute to the spread of INNS.

Management actions associated with each alternative (see Chapter 2) afford some degree of reclamation following surface disturbance and some degree of protection of highly erodible soils or soils occurring on steep slopes. However, because of how they are formulated, these protective measures are anticipated to be more effective under some alternatives (e.g., Alternative B) and less effective under other alternatives (e.g., Alternative C). These protective measures may not apply to lands under state and fee (i.e., private) ownership. Moreover, protective measures may be applied unevenly across the planning area and enforcement and monitoring of protective measures depend on land ownership and funding. Some private lands are subject to local protective measures; however, the nature and extent of these measures are expected to vary for private lands within the planning area.

Similar to the impact analysis described in the INNS section, Table 4-19 supports the conclusion that cumulative surface disturbance acreage is anticipated to be the most under Alternative C and the least under Alternative B for the entire planning area. Likewise, due to management actions and restrictions, INNS spread associated with nonsurface-disturbing activities (i.e., livestock grazing, OHV use, fire, recreational activities, and dispersed travel) are anticipated to be the most under Alternative C and the least under Alternative B for lands managed by the BLM. Considering BLM and non-BLM actions, projected surface disturbance, nonsurface-disturbing activities, and management actions for alternatives, the projected INNS cumulative impacts in the planning area are anticipated to be highest and similar under alternatives A and C and lowest and similar under alternatives B and D.

Cooperation between the Sweetwater, Lincoln, Uinta, and Sublette County Weed and Pest Control Districts and the BLM is anticipated to continue throughout the life of this plan; however, the long-term effectiveness of INNS control measures on all public and private lands in the planning area depends on continued cooperation, available funding, agency priorities, and the effectiveness and periodic assessment of weed-management activities in accordance with a comprehensive weed-management plan. Unchecked INNS could overwhelm attempts at control and substantially impact fire and fuels management,

biological resources, livestock grazing (by reducing rangeland productivity and AUMs, and recreation (by impacting wildlife habitats and scenic quality) throughout the planning area.

Cumulative Issue 2 – The cumulative impact of management actions and constraints on oil and gas development

The unconstrained RFD projection over the life of the plan is 2,680 new wells (76-percent oil and gas wells and 24-percent CBNG wells) in the planning area (BLM 2006b). During the RMP alternative formulation process, management actions and allowable uses were identified for individual resource programs, which spatially and temporally constrained and, thus, impacted mineral development. Constraints included prohibiting or deferring leasing, CSU restrictions, TLS, and stipulations on conditions of approval for application to drill. Oil and gas leasing would continue to be deferred in the MMTA, including the portion that lies within the RSFO planning area. The areas immediately surrounding the MMTA in both BLM planning areas have primarily low potential for oil and gas development and no potential for CBNG. Projections from the Kemmerer planning area RFD and GIS analyses indicated that a total of 59,967 acres of federal mineral estate with low potential for oil and gas development, 11,285 acres of medium development potential, and 685 acres of high development potential in the MMTA would be deferred from oil and gas leasing for the life of the RMP or until safety issues are resolved. The RSFO planning area also contains 43,221 acres of federal mineral estate that would be deferred from oil and gas leasing. These constraints reduce the unconstrained estimated number of well locations, and, in general, increase development costs and reduce production in areas of federal oil and gas ownership.

The constraints identified above are not applied to nonfederal (state and fee minerals) wells. While other constraints may be applied to nonfederal wells, the impact of such constraints cannot be quantified for this analysis. The number of unconstrained baseline wells, constrained federal wells, and unconstrained nonfederal wells projected for each alternative over the life of the plan are summarized in Table 4-20.

Table 4-20. Reasonable Foreseeable Development Well Number Projections

Well Type	Baseline	Alternative A	Alternative B	Alternative C	Alternative D *(Proposed RMP)*
Number of Projected New Federal Wells	1,221	1,012	503	1,020	1,010
Projected Number of Abandoned New Federal Wells	190	146	74	156	152
Projected Productive New Federal Wells	1,031	866	429	864	858
Number of Projected New Nonfederal Wells	1,459	1,459	1,459	1,459	1,459
Projected Number of Abandoned New Nonfederal Wells	216	216	216	216	216
Projected Productive New Nonfederal Wells	1,243	1,243	1,243	1,243	1,243
Cumulative New Wells (Federal/Nonfederal)	2,680	2,471	1,962	2,479	2,469
Cumulative Abandoned New Wells (Federal/Nonfederal)	406	362	290	372	368
Cumulative Productive New Wells (Federal/Nonfederal)	2,274	2,109	1,672	2,107	2,101

The projected number of new nonfederal wells (1,459) is approximately 54 percent of the cumulative number of new wells (2,680) predicted for the planning area between 2001 and 2020. Restrictions placed

on federal wells under the various alternatives reduce the number of new wells compared to the unconstrained baseline of 2,680 wells, as follows.

Percent reduction from baseline projected unconstrained new wells:

- Alternative A – 8 percent
- Alternative B – 27 percent
- Alternative C – 8 percent
- Alternative D – 8 percent

The cumulative impact of federal and nonfederal wells on surface disturbance and INNS, special status species, cultural resources, and social and economic conditions are described under the appropriate cumulative issue in this section.

Cumulative Issue 3 – The cumulative impact of water depletion on downstream special status species

Anticipated water depletions from BLM actions and the potential impacts to special status species are described in the Fish and Wildlife Resources – Fish, Special Status Species – Fish, and Water sections of this chapter. Water depletions from BLM actions are anticipated from development of oil and gas wells and livestock water sources. Water depletions from non-BLM actions also are anticipated from the development of oil and gas wells and livestock water sources, and are not expected to substantively vary by alternative. Table 4-21 shows the projected average annual water depletion from BLM and non-BLM actions within the planning area.

Table 4-21. Projected Cumulative Annual Water Depletion from BLM and Non-BLM Actions over the Life of the Plan

	Alternative A	Alternative B	Alternative C	Alternative D *(Preferred Alternative)*
Projected Average Annual Depletion from BLM Actions (acre-feet)	96.9	49.2	97.7	96.9
Projected Average Annual Depletion from Non-BLM Actions (acre-feet)	148.2	148.2	148.2	148.2
Projected Cumulative Annual Depletion from BLM and Non-BLM Actions in the Planning Area (acre-feet)	245.1	197.4	245.9	245.1

BLM Bureau of Land Management

Table 4-21 does not include predictions of water depletions associated with urban development within the planning area. As population centers within the Colorado River System grow and larger tracts of land are subdivided into smaller, more numerous residential properties, water depletions within the Colorado River watershed are expected to increase irrespective of BLM-actions.

Because projected water depletions from BLM actions are similar and highest under alternatives A, C, and D, and because water depletions from non-BLM actions are not expected to vary by alternative, the greatest adverse cumulative water depletions are anticipated under alternatives A, C, and D, and the least adverse cumulative water depletions under Alternative B.

Cumulative Issue 4 – The cumulative impact of habitat fragmentation on wildlife and special status wildlife species

The condition of the planning area with respect to habitat fragmentation is described in the introduction of Biological Resources, Chapter 3. Potential impacts contributing to habitat fragmentation are described in the introduction of Biological Resources in this chapter. Potential impacts stemming from habitat fragmentation are described in appropriate biological resources sections (e.g., vegetation, wildlife), in this chapter.

The challenge of habitat fragmentation and associated impacts, primarily to biological resources, is anticipated to continue under all alternatives. Moreover, surface-disturbing activities, fire, spread of INNS, and activities that remove vegetation and disturb soil are anticipated to contribute to habitat fragmentation within the planning area, regardless of land ownership. Habitat fragmentation from non-BLM actions in the planning area is primarily anticipated from wildland urban interface (WUI) development, energy development, and associated infrastructure (e.g., roads), although the intensity of development on private lands is not expected to vary by alternative. The majority of habitat fragmentation is anticipated to occur proximate to population centers (e.g., Kemmerer) and in the WUI, where private lands abut public ownership.

Supported by favorable economic conditions, population centers are expected to grow in both geographic area and population density over the life of the plan. The trend in western states of subdividing larger private parcels to support development of residential subdivisions and ranchettes (e.g., 35-acre parcels) is expected to continue and contribute to habitat fragmentation. As larger tracts of land adjacent to public lands are subdivided, the WUI and its associated issues (e.g., fragmentation, fire suppression, spread of INNS) are also expected to grow. As the WUI expands, some tracts of BLM-administered land may become disconnected or isolated from other native habitats and ultimately adversely impact planning area biological diversity. The fences, roads, spread of INNS, fire suppression, and changes in land use associated with an expanding WUI all serve to fragment habitat. In addition, multiple land owners in the WUI, and especially in the eastern planning area, are expected to result in varied management of resources and resource use impacting habitat fragmentation, including INNS spread, fire, wildlife, livestock grazing, OHV use, and development.

The most adverse cumulative habitat fragmentation impacts are anticipated under alternatives A and C because these alternatives will result in the most cumulative long-term disturbance and management actions associated with these alternatives do not limit habitat fragmentation. Alternatives A and C generally are anticipated to allow the most development with the least restrictions on BLM-administered lands. Based on the amount of BLM-administered land proposed for managing habitat fragmentation, alternatives B and D are anticipated to have the least adverse impact and alternatives A and C are expected to have the most adverse impact to habitat fragmentation. Although, for this analysis, habitat fragmentation from non-BLM actions are assumed to not vary across alternatives, the magnitude of fragmentation from non-BLM actions on private lands is expected to be greater than fragmentation on public lands. This conclusion is based on the fact that privately held land surface in the planning area is and will continue to be subject to fewer restrictions and more development compared to public lands.

Cumulative Issue 5 – The cumulative impact of development activities on the context and historical setting of cultural resources (including National Historic Trails)

The cumulative impact of development activities from BLM and non-BLM actions within the planning area is anticipated to adversely impact the context and historical setting of some cultural resources and NHTs. No quantitative data are available for assessing cumulative impacts to the contexts and historical

settings of cultural resources and NHTs. Moreover, plan alternatives are not anticipated to result in measurable differences in impacts to historical settings from non-BLM actions.

In general, although cultural resources on public land enjoy legal protection, similar protection does not apply to cultural resources from private actions on private lands. Likewise, limited restrictions on public lands exist to protect the historical setting of cultural resources on public lands. Due to the mixture of public and private land ownership adjacent to other cultural resources such as NHTs, cumulative impacts to the historical setting are not regulated and are expected to continue. For example, although the BLM may elect to prevent surface occupancy within a defined distance from NHTs, no similar requirement applies to adjacent private lands. No basis exists for assuming any difference in cumulative impact of development activities on the historical setting of cultural resources and NHTs.

With increased development comes the potential to lose increasing amounts of scientific information derived from cultural resources, resulting in a cumulative net loss of historical context. In turn, this might lead to a diminished capacity to understand and evaluate issues of national heritage. Based solely on projected long-term disturbance (see Table 4-19) in the planning area, Alternatives A and C are anticipated to result in the most cumulative adverse impact on the context and historical setting of cultural resources. Similarly, Alternative B is anticipated to result in the least cumulative adverse impact on the context and historical setting of cultural resources. The anticipated cumulative adverse impact due to Alternative D is more than Alternative B and less than Alternatives A and C.

Cumulative Issue 6 – The cumulative impact of management actions and projected development on the economy of local communities

Cumulative impacts to economic conditions most likely are related to oil and gas activity and ranching and livestock grazing. The impacts of oil and gas drilling and production described in the economic impact section of this chapter relate to activities only on BLM-administered surface and federal mineral estate within the planning area. However, oil and gas activity on private and state land is estimated to constitute about 60 percent of oil and gas activity in alternatives A, C, and D, and about 70 percent of activity in Alternative B. Thus, when oil and gas activity on state and private land is taken into account, the reduction in overall activity in Alternative B – and associated earnings, employment, output, and projected tax revenues – is proportionally smaller (compared to the reduction in activity on federal lands only). Table 4-22 summarizes potential economic impacts due to estimated oil and gas activity on federal, state, and private lands.

Oil and gas development is driven primarily by variables outside of the BLM's control, including national and international energy prices, investment within the planning area, and business strategies of operators. In addition, oil and gas activity on state and private lands will be impacted by land management decisions of other agencies and individuals. Because the pace of development is unknown, actual cumulative impacts may differ from those projected in Table 4-22.

Because energy prices are the predominant force behind the pace of oil and gas development, some communities may experience boom and bust cycles as a result of fluctuations in energy prices. This can cause hardships to local populations because of the temporary increased demand for housing and community services. Infrastructure may be expanded during boom times, and loans or bonds to pay for expansion of infrastructure must still be repaid if the boom turns to a bust.

Table 4-22. Cumulative (including state and private) Impacts of Oil and Gas Development over the Life of the Plan in the Kemmerer Planning Area[1]

Impact	Alternative A	Alternative B	Alternative C	Alternative D *(Proposed RMP)*
Annual Average Earnings	$52.6 - $54.4	$43.8 - $45.3	$52.7 - $54.5	$52.2 - $54.0
Annual Average Output	$865.7 - $871.8	$731.0 - $736.0	$866.8 - $872.9	$862.2 - $868.2
Net Present Value of Output	$7,543 - $7,605	$6,409 - $6,460	$7,552 - $7,614	$7,511 - $7,573
Annual Average Employment[2]	1,367 - 1,451	1,137 - 1,206	1,368 - 1,453	1,358 - 1,441
Annual Average Federal Tax Revenues[3]	$32.2	$20.5	$32.3	$31.9
Annual Average State Tax Revenues[3]	$36.9	$31.2	$36.9	$36.7
Annual Average Local Tax Revenues[3]	$38.7	$32.8	$38.7	$38.6

Source: Calculated using the IMPLAN model, as described in the text.

[1]All dollar values are in millions of year 2004 dollars and represent annual averages, except for the net present value of output, which is discounted at a 7-percent real discount rate, as recommended in OMB 2002. The range of estimated impacts for earnings, output, and employment represents the high and low scenarios for oil and gas drilling and completion, which are described in the Economic Impacts section. The high scenario reflects an assumption that workers involved in oil and gas drilling and completion spend most or all of their earnings in the three-county area, while the low scenario reflects an assumption that these workers spend none of their earnings in the three-county area.

[2]Employment is in annual job equivalents and represents an annual average.

[3]Represents tax revenues from production only.

Increasing energy development, such as the recent expansion in oil and gas drilling and production, is likely to have substantive social impacts in larger cities in the planning area (e.g., Kemmerer and Evanston) and may also have substantive social impacts in less densely populated towns. Because much of the economy of the area is dependent on extractive industries, towns and cities may have difficulty absorbing the increase in population likely to result from the recent expansion in oil and gas development. However, increased oil and gas development will bring increased local and state tax revenues, which will to some extent, mitigate the increased demand for community services and infrastructure that more development will bring.

A potential for cumulative economic impacts related to livestock grazing and ranching also exists. Cattle and sheep ranchers in the planning area face increasing pressure from local land developers and market trends. The potential loss of BLM land currently available for grazing, in addition to pre-existing economic pressures, could result in some adverse economic impacts to some ranchers. The cumulative impact of INNS spread on private and public lands, and an associated reduction in forage could adversely impact livestock grazing.

The cumulative impacts of BLM management actions is not anticipated to have long-term adverse impacts on livestock grazing on public lands, since the projected availability of federal AUMs is generally constant over the life of the plan. Non-BLM actions that remove private lands from livestock grazing (such as development and urbanization) could result in adverse cumulative economic and social impacts related to livestock grazing. However, given that impacts on grazing lands occur gradually over the life of this plan and would be spread over the planning area, adverse economic impacts on individual ranchers is not anticipated. On the other hand, even if economic impacts on ranchers are not substantial, the social impacts could be more significant because of the importance of ranching to the custom, culture, and history of communities in the planning area.

Cumulative Issue 7 – The cumulative impact of air quality on public health and welfare within the planning area and protected Class I areas outside the planning area

Base year and anticipated annual air emissions for the life of the plan are organized by project scenario and resource as shown in Tables 4-23 to 4-27 at the end of this chapter. These tables identify each anticipated emission category for: (1) projected BLM actions, (2) projected non-BLM actions, and (3) the

cumulative total of these actions. GHG emissions are not included in this table because the assessment of GHG emissions and climate change is still in its formative phase, so it is not yet possible to know with confidence the net impact to climate. It is reasonable to assume that potential impacts to air quality from projected BLM and non-BLM actions due to climate change are likely to be varied and to recognize that they cannot be quantified.

BLM and non-BLM RFAs are anticipated to increase emissions in the planning area over the life of the plan. For the planning area, the cumulative air quality impacts (as measured against national and state ambient air quality standards) are anticipated to be roughly the same on BLM and non-BLM-managed lands because it is assumed that the density of activities is the same in both areas. This conclusion also assumes that nearby operations on both BLM and non-BLM-managed lands would not combine to result in greater impacts on a local scale. Plumes from trona processing plants located on private land are currently visible on BLM-managed lands, especially during winter air inversions, and are expected to continue to be visible in the future. Although cumulative projected emissions under all alternatives are similar for PM_{10}, $PM_{2.5}$, and SO_x, emissions of NO_x, VOCs, and HAPs are projected to be lower under Alternative B, due to proposed development restrictions on BLM-managed land. Cumulative emissions within the planning area are not anticipated to result in air quality impacts that exceed national or state ambient air quality standards because the emission sources likely will be widely separated. It should be recognized, however, that there have been some recent short-term exceedances of the federal ozone standard in Sublette County, Wyoming, northeast of the planning area, although the area has not been designated in nonattainment. Potential impacts to prevention of significant deterioration increments, visibility and atmospheric deposition in distant Class I wilderness areas, may be substantial.

4.10 Irreversible and Irretrievable Commitment of Resources

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 resources refers to decisions impacting the use of nonrenewable resources. For example, extraction and processing of sand and gravel as part of an aggregate mining operation is considered an irreversible commitment of salable minerals because once the minerals are extracted and processed, they cannot be renewed in the ground within a reasonable timeframe. An irretrievable commitment of resources refers to decisions resulting in the loss of production or use of a resource. For example, a decision not to treat woodlands encroaching into adjacent grassland habitat results in the irretrievable loss of forage production from the grassland community. This action is not irreversible, because once a treatment is applied, the forage production of the grassland is restored.

The decision to select one of the four alternatives described in this Proposed RMP and Final EIS does not constitute an irreversible or irretrievable commitment of resources because the decision does not authorize on-the-ground activities. Instead, decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following the signing of the Record of Decision (ROD) for the RMP, subsequent implementation plans (activity- or project-specific) will be developed and implemented by the BLM. Implementing decisions requires appropriate project-specific planning, NEPA analysis, and BLM's final approval authorizing on-the-ground activities to proceed.

Assuming that BLM selects one of the action alternatives and that subsequent implementation decisions authorize activity- or project-specific plans, irreversible and irretrievable commitment of resources could occur to select resources. No irreversible or irretrievable commitment of resources are anticipated for air quality, geologic resources, fire and fuels management, vegetation, fish and wildlife, special status species, visual resources, lands and realty, renewable energy, rights-of-way and corridors, travel management, recreation, special designations, and social resources.

Physical, Biological, and Heritage Resources

Soil. Surface-disturbing activities, nonmechanized activities, and natural processes cause soil erosion in the planning area. 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 irretrievable loss of soil productivity.

Water. Depletion of water to the Colorado River from BLM actions in the Bear, Green, and the Colorado watersheds may result in an irretrievable commitment of water that would otherwise have contributed to the Colorado River System. The production of water from oil and gas wells in the planning area may be an irretrievable commitment of groundwater depending on its use once it reaches the surface.

Coal. Removal of coal from the ground is considered an irreversible commitment of these resources.

Fluid Minerals. Removal of oil and gas from the ground is considered an irreversible commitment of these resources.

Locatable Minerals. Removal of locatable minerals from the ground is considered an irreversible commitment of these resources.

Mineral Materials. Removal of mineral materials from the ground is considered an irreversible commitment of these resources.

Nonenergy Leasables. Removal of nonenergy leasable minerals from the ground is considered an irreversible commitment of these resources.

Resource Uses

Forest Products. Any decision to prohibit silviculture treatments is an irretrievable commitment of the wood fiber produced. As trees grow older, ultimately die, and decompose, the wood fiber that was not treated is irretrievably lost.

Livestock Grazing. Forage utilized by livestock is unavailable for utilization by wildlife. Conversely, any decision to prohibit livestock grazing is an irretrievable commitment of the forage produced. As grasses and forbs grow older, ultimately die, and decompose, the forage that is not utilized is irretrievably lost for concurrent production of wildlife or livestock; however, nutrients returned to the soil from decomposed plants will contribute to future forage production.

4.11 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the residual impacts of implementing management actions or allowable uses after BMPs and mitigation measures are applied.

The decision to select one of the four alternatives described in this Proposed RMP and Final EIS does not result in unavoidable adverse impacts because the decision does not authorize on-the-ground activities. Instead, decisions made in the selected plan serve to guide future actions and subsequent site-specific decisions. Following signing of the ROD for the RMP, subsequent plans (activity- or project-specific) will be developed and implemented by BLM. Implementation decisions require appropriate project-specific planning and NEPA analysis and constitute BLM's final approval authorizing on-the-ground activities to proceed.

Assuming that BLM selects one of the action alternatives and that subsequent implementation decisions authorize activity- or project-specific plans, unavoidable adverse impacts could occur to select resources.

Surface-disturbing activities (e.g., construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining and mineral processing, and vegetation treatments), OHV use, fire and fuels management, some recreational activities, and operation and maintenance of existing facilities and infrastructure in the planning area will cause fugitive dust, exhaust emissions, and smoke, thereby adversely impacting air quality.

Surface-disturbing activities, OHV use, fire and fuels management, some recreational activities, uncontrolled animal concentrations, and operation and maintenance of existing facilities and infrastructure in the planning area may cause soil erosion and soil compaction. These same activities, in combination with precipitation events, also may result in runoff and sedimentation to existing surface waters. Additional unavoidable adverse impacts from these activities include transport and spread of INNS in the planning area. INNS will continue to spread via the wind, in water courses, and by attaching to livestock, wildlife, humans, and vehicles. The presence of INNS in the planning area is considered an unavoidable impact.

Surface-disturbing activities and the development of mineral, energy, and other facilities in the planning area are expected to cause the unavoidable degradation, loss, and fragmentation of habitats. OHV use, fire and fuels management, some recreational activities, concentrated livestock grazing, and operation and maintenance of existing facilities and infrastructure in the planning area may contribute to the unavoidable degradation, loss, and fragmentation of habitats.

Protection of some resource values (e.g., wildlife, special status species, cultural, and paleontological resources) will adversely impact the use of other resources, such as minerals and renewable energy. Conversely, use of minerals and renewable energy are expected to adversely impact the distribution of some wildlife, special status species, and vegetative communities.

Surface-disturbing activities and development from BLM actions unavoidably will change the landscape, scenic quality, and setting in the planning area. Non-BLM actions on lands adjacent to BLM-administered lands also will change the landscape and setting. Fire, insect and disease damage, and development also are expected to temporarily impact the scenic quality of the planning area. Surface-disturbing activities, OHV use, vandalism, and natural processes (e.g., fire and erosion) may adversely impact cultural and paleontological resources in the planning area.

Table 4-23. Cumulative Annual Emissions for BLM Activities within the Kemmerer Planning Area – Baseline Year 2001

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	113.70	163.61	277.31	68.76	98.94	167.70	869.86	1,251.74	2,121.60	62.88	90.49	153.38
Oil Development/Production	6.37	9.16	15.53	1.08	1.55	2.63	7.44	10.71	18.15	0.97	1.40	2.37
Locatable Minerals	1.22	1.83	3.06	0.96	1.45	2.41	17.28	25.93	43.21	0.41	0.62	1.03
Salable Minerals	289.59	434.39	723.99	34.00	51.00	85.00	20.35	30.52	50.87	0.23	0.34	0.57
Coal Mining	407.10	0.00	407.10	142.08	0.00	142.08	1,320.30	0.00	1,320.30	1.50	0.00	1.50
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.80	6.76	10.56	0.43	0.76	1.18	0.45	0.80	1.25	0.01	0.02	0.03
ROW Corridors	72.73	129.30	202.02	54.36	96.64	151.00	892.53	1,586.73	2,479.26	21.29	37.85	59.14
Livestock/Grazing	2.36	4.20	6.56	0.41	0.73	1.14	1.12	1.98	3.10	0.03	0.06	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.02	0.04	0.05	0.00	0.00	0.00
OHVs	7.11	12.63	19.74	7.11	12.63	19.74	2.99	5.31	8.29	0.00	0.00	0.00
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2,839.95**	**1,363.72**	**4,203.67**	**2,243.56**	**862.70**	**3,106.26**	**7,987.43**	**3,218.85**	**11,206.28**	**5,130.63**	**132.78**	**5,263.41**

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	822.86	1,184.12	2,006.98	6,147.52	8,846.43	14,993.94	622.85	896.29	1,519.14
Oil Development/Production	2.01	2.89	4.89	0.27	0.39	0.66	0.03	0.04	0.07
Locatable Minerals	6.11	9.17	15.28	1.57	2.35	3.92	0.16	0.24	0.39
Salable Minerals	3.41	5.12	8.53	0.86	1.29	2.15	0.09	0.13	0.22
Coal Mining	285.10	0.00	285.10	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.14	0.26	0.40	0.04	0.06	0.10	0.00	0.01	0.01
ROW Corridors	328.28	583.60	911.88	84.72	150.62	235.34	8.47	15.06	23.53
Livestock/Grazing	0.52	0.92	1.43	0.12	0.22	0.34	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	0.05	0.09	0.14	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	433.98	771.52	1,205.50	233.50	415.12	648.62	23.35	41.51	64.86
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	6,372.16	6,174.68	12,546.84	13,673.31	9,829.34	23,502.65	1,128.21	1,048.15	2,176.35

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-23. Cumulative Annual Emissions for BLM Activities within the Kemmerer Planning Area – Baseline Year 2001 *(Continued)*

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	111.37	160.27	271.64	67.09	96.54	163.63	848.82	1,221.47	2,070.29	64.44	92.73	157.18
Oil Development/Production	0.57	0.82	1.38	0.25	0.36	0.60	6.27	9.03	15.30	0.83	1.20	2.03
Locatable Minerals	1.22	1.83	3.06	0.96	1.45	2.41	17.28	25.93	43.21	0.41	0.62	1.03
Salable Minerals	289.59	434.39	723.99	34.00	51.00	85.00	20.35	30.52	50.87	0.23	0.34	0.57
Coal Mining	407.10	0.00	407.10	142.08	0.00	142.08	1,320.30	0.00	1,320.30	1.50	0.00	1.50
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.80	6.76	10.56	0.43	0.76	1.18	0.45	0.80	1.25	0.01	0.02	0.03
ROW Corridors	72.73	129.30	202.02	54.36	96.64	151.00	892.53	1,586.73	2,479.26	21.29	37.85	59.14
Livestock/Grazing	2.36	4.20	6.56	0.41	0.73	1.14	1.12	1.98	3.10	0.03	0.06	0.09
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.02	0.04	0.05	0.00	0.00	0.00
OHVs	7.11	12.63	19.74	7.11	12.63	19.74	2.99	5.31	8.29	0.00	0.00	0.00
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2,831.83	1,352.02	4,183.85	2,241.06	859.10	3,100.16	7,965.23	3,186.90	11,152.12	5,132.05	134.82	5,266.87

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
CBNG Development/Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Development/Production	800.80	1,152.37	1,953.16	6,144.48	8,842.06	14,986.55	622.31	895.52	1,517.82
Oil Development/Production	1.57	2.26	3.83	0.20	0.29	0.49	0.02	0.03	0.05
Locatable Minerals	6.11	9.17	15.28	1.57	2.35	3.92	0.16	0.24	0.39
Salable Minerals	3.41	5.12	8.53	0.86	1.29	2.15	0.09	0.13	0.22
Coal Mining	285.10	0.00	285.10	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.14	0.26	0.40	0.04	0.06	0.10	0.00	0.01	0.01
ROW Corridors	328.28	583.60	911.88	84.72	150.62	235.34	8.47	15.06	23.53
Livestock/Grazing	0.52	0.92	1.43	0.12	0.22	0.34	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Forest and Woodlands	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vegetation Management	0.05	0.09	0.14	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	668.86	1,189.08	1,857.94	233.50	415.12	648.62	23.35	41.51	64.86
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	6,584.54	6,559.86	13,144.40	13,670.21	9,824.87	23,495.08	1,127.66	1,047.36	2,175.02

BLM	Bureau of Land Management	HAP	hazardous air pollutant	PM_{10}	particulate matter less than 10 microns in diameter	SO_x	sulfur oxides
CBNG	coalbed natural gas	NO_x	nitrogen oxides	$PM_{2.5}$	particulate matter less than 2.5 microns in diameter	VOC	volatile organic compound
CO	carbon monoxide	OHV	off-highway vehicles	ROW	rights-of-way		

Table 4-24. Cumulative Annual Emissions Associated with Alternative A

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	19.07	27.44	46.51	6.50	9.35	15.85	27.41	39.44	66.85	0.21	0.30	0.50
Natural Gas Development/Production	174.86	251.62	426.48	96.92	139.47	236.39	1,229.86	1,769.80	2,999.67	80.53	115.88	196.41
Oil Development/Production	1.06	1.52	2.58	0.50	0.72	1.21	13.00	18.71	31.71	1.72	2.48	4.20
Locatable Minerals	0.63	0.95	1.58	0.37	0.56	0.94	9.08	13.62	22.70	0.08	0.12	0.20
Salable Minerals	289.26	433.89	723.15	33.67	50.50	84.16	14.95	22.42	37.37	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	41.08	73.04	114.12	22.72	40.38	63.10	477.50	848.90	1,326.40	3.91	6.94	10.85
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	68.43	121.66	190.09	10.30	18.31	28.61	0.27	0.48	0.75	0.01	0.02	0.03
Forest and Woodlands	7.10	12.61	19.71	1.07	1.90	2.97	0.01	0.02	0.04	0.00	0.00	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Geophysical Exploration	12.80	0.00	12.80	12.40	0.00	12.40	115.00	0.00	115.00	9.20	0.00	9.20
Project Year 2011 Total	4,214.60	3,679.25	7,893.85	2,471.21	1,206.02	3,677.23	8,218.31	3,034.71	11,253.02	5,140.77	127.99	5,268.76

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	45.95	66.13	112.09	22.56	32.46	55.01	3.59	5.16	8.75
Natural Gas Development/Production	1,120.49	1,612.42	2,732.91	5,198.27	7,480.44	12,678.71	531.15	764.34	1,295.50
Oil Development/Production	3.26	4.68	7.94	0.42	0.60	1.02	0.04	0.06	0.10
Locatable Minerals	2.36	3.54	5.90	0.56	0.83	1.39	0.06	0.08	0.14
Salable Minerals	1.21	1.81	3.02	0.35	0.52	0.87	0.03	0.05	0.09
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.42	249.63	390.05	33.28	59.17	92.45	3.33	5.92	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.16	2.07	3.23	0.46	0.82	1.28	0.05	0.08	0.13
Forest and Woodlands	0.27	0.48	0.75	0.09	0.15	0.24	0.01	0.02	0.02
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Geophysical Exploration	81.20	0.00	81.20	14.40	0.00	14.40	0.00	0.00	0.00
Project Year 2011 Total	7,425.01	7,730.57	15,155.58	12,932.38	8,800.83	21,733.21	1,057.24	951.87	2,009.10

Table 4-24. Cumulative Annual Emissions Associated with Alternative A *(Continued)*

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	34.18	49.18	83.35	13.73	19.76	33.49	59.86	86.14	146.00	0.27	0.39	0.67
Natural Gas Development/Production	208.16	299.55	507.72	120.78	173.81	294.59	1,528.09	2,198.96	3,727.05	82.12	118.17	200.29
Oil Development/Production	1.24	1.78	3.01	0.52	0.75	1.27	13.06	18.80	31.86	1.73	2.49	4.22
Locatable Minerals	0.37	0.55	0.92	0.11	0.16	0.27	0.78	1.16	1.94	0.08	0.12	0.20
Salable Minerals	289.11	433.67	722.78	33.52	50.28	83.79	10.29	15.44	25.74	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.68	43.88	68.56	6.31	11.22	17.54	70.45	125.24	195.68	3.91	6.94	10.85
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	68.43	121.65	190.08	10.29	18.30	28.60	0.07	0.13	0.20	0.01	0.02	0.03
Forest and Woodlands	7.10	12.61	19.71	1.07	1.90	2.97	0.01	0.02	0.04	0.00	0.00	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Geophysical Exploration	12.80	0.00	12.80	12.40	0.00	12.40	115.00	0.00	115.00	9.20	0.00	9.20
Project Year 2020 Total	3,058.49	1,607.59	4,666.07	2,309.78	908.60	3,218.38	8,128.31	2,766.27	10,894.57	5,142.34	130.22	5,272.56

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	111.33	160.21	271.55	55.18	79.40	134.58	8.81	12.67	21.48
Natural Gas Development/Production	1,439.45	2,071.40	3,510.85	5,339.60	7,683.82	13,023.42	548.67	789.56	1,338.23
Oil Development/Production	3.27	4.71	7.98	0.42	0.61	1.03	0.04	0.06	0.10
Locatable Minerals	0.60	0.91	1.51	0.39	0.58	0.96	0.04	0.06	0.10
Salable Minerals	0.18	0.27	0.45	0.18	0.27	0.44	0.02	0.03	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.51	57.79	90.29	19.36	34.42	53.77	1.94	3.44	5.38
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.96	1.71	2.68	0.29	0.51	0.79	0.03	0.05	0.08
Forest and Woodlands	0.23	0.40	0.63	0.04	0.07	0.11	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Geophysical Exploration	81.20	0.00	81.20	14.40	0.00	14.40	0.00	0.00	0.00
Project Year 2020 Total	7,981.96	8,591.30	16,573.26	13,186.42	9,193.61	22,380.03	1,087.99	998.83	2,086.82

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-25. Cumulative Annual Emissions Associated with Alternative B

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	8.54	12.29	20.82	2.92	4.21	7.13	12.26	17.64	29.89	0.09	0.13	0.23
Natural Gas Development/Production	122.94	176.91	299.85	73.43	105.67	179.10	929.64	1,337.77	2,267.41	38.83	55.88	94.72
Oil Development/Production	0.63	0.90	1.53	0.27	0.39	0.66	6.74	9.69	16.43	0.89	1.28	2.18
Locatable Minerals	0.32	0.48	0.79	0.19	0.28	0.47	4.54	6.81	11.35	0.04	0.06	0.10
Salable Minerals	269.98	404.97	674.95	31.45	47.18	78.64	13.90	20.85	34.75	0.03	0.04	0.07
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	40.98	72.85	113.83	22.69	40.35	63.04	477.47	848.83	1,326.29	3.90	6.93	10.83
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	68.43	121.66	190.09	10.30	18.31	28.61	0.27	0.48	0.75	0.01	0.02	0.03
Forest and Woodlands	5.68	10.09	15.77	0.86	1.52	2.38	0.01	0.02	0.03	0.00	0.00	0.01
Vegetation Management	0.83	1.48	2.31	0.13	0.22	0.35	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Project Year 2011 Total	4,116.76	3,554.81	7,671.57	2,428.73	1,162.45	3,591.18	7,776.03	2,563.40	10,339.43	5,088.88	66.56	5,155.44

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	20.49	29.48	49.97	10.05	14.47	24.52	1.60	2.30	3.90
Natural Gas Development/Production	889.52	1,280.04	2,169.57	3,682.41	5,299.08	8,981.50	377.39	543.07	920.46
Oil Development/Production	1.69	2.43	4.12	0.22	0.31	0.53	0.02	0.03	0.05
Locatable Minerals	1.18	1.77	2.95	0.28	0.42	0.69	0.03	0.04	0.07
Salable Minerals	1.12	1.69	2.81	0.32	0.49	0.81	0.03	0.05	0.08
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.35	249.50	389.85	33.26	59.13	92.39	3.33	5.91	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.16	2.07	3.23	0.46	0.82	1.28	0.05	0.08	0.13
Forest and Woodlands	0.22	0.39	0.60	0.07	0.12	0.19	0.01	0.01	0.02
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Project Year 2011 Total	7,084.41	7,357.18	14,441.59	11,389.08	6,600.67	17,989.75	901.43	727.65	1,629.08

Table 4-25. Cumulative Annual Emissions Associated with Alternative B (*Continued*)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	14.50	20.87	35.37	5.77	8.30	14.07	24.98	35.95	60.92	0.12	0.17	0.29
Natural Gas Development/Production	136.21	196.01	332.21	82.93	119.34	202.27	1,047.94	1,508.01	2,555.94	39.47	56.80	96.27
Oil Development/Production	0.73	1.05	1.79	0.28	0.41	0.69	6.78	9.75	16.53	0.90	1.29	2.19
Locatable Minerals	0.18	0.28	0.46	0.05	0.08	0.14	0.39	0.58	0.97	0.04	0.06	0.10
Salable Minerals	269.84	404.76	674.60	31.32	46.97	78.29	9.57	14.36	23.93	0.03	0.04	0.07
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.58	43.69	68.27	6.29	11.19	17.48	70.41	125.18	195.59	3.90	6.93	10.83
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	68.43	121.65	190.08	10.29	18.30	28.60	0.07	0.13	0.20	0.01	0.02	0.03
Forest and Woodlands	5.68	10.09	15.77	0.86	1.52	2.38	0.01	0.02	0.03	0.00	0.00	0.01
Vegetation Management	0.83	1.48	2.31	0.13	0.22	0.35	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Project Year 2020 Total	2,931.54	1,441.27	4,372.80	2,248.68	838.25	3,086.93	7,490.84	2,014.34	9,505.18	5,089.45	67.34	5,156.79

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	46.15	66.42	112.57	22.86	32.90	55.76	3.65	5.25	8.90
Natural Gas Development/Production	1,016.70	1,463.06	2,479.76	3,211.36	4,621.23	7,832.59	331.64	477.23	808.87
Oil Development/Production	1.70	2.44	4.14	0.22	0.32	0.54	0.02	0.03	0.05
Locatable Minerals	0.30	0.45	0.76	0.19	0.29	0.48	0.02	0.03	0.05
Salable Minerals	0.17	0.25	0.42	0.17	0.25	0.41	0.02	0.02	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.44	57.66	90.10	19.34	34.38	53.72	1.93	3.44	5.37
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fire Management	0.96	1.71	2.68	0.29	0.51	0.79	0.03	0.05	0.08
Forest and Woodlands	0.18	0.32	0.50	0.03	0.06	0.09	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Geophysical Exploration	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Project Year 2020 Total	7,410.83	7,886.21	15,297.05	11,011.03	6,083.87	17,094.90	865.74	679.02	1,544.77

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

Table 4-26. Cumulative Annual Emissions Associated with Alternative C

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	18.52	26.66	45.18	6.23	8.97	15.20	26.20	37.70	63.89	0.20	0.29	0.50
Natural Gas Development/Production	175.08	251.95	427.03	97.08	139.70	236.79	1,231.91	1,772.75	3,004.67	80.62	116.01	196.63
Oil Development/Production	1.06	1.52	2.58	0.50	0.72	1.21	13.00	18.71	31.71	1.72	2.48	4.20
Locatable Minerals	0.63	0.95	1.58	0.37	0.56	0.94	9.08	13.62	22.70	0.08	0.12	0.20
Salable Minerals	289.26	433.89	723.15	33.67	50.50	84.16	14.95	22.42	37.37	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	41.08	73.04	114.12	22.72	40.38	63.10	477.50	848.90	1,326.40	3.91	6.94	10.85
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	0.53	0.94	1.46	0.11	0.19	0.30	0.15	0.27	0.42	0.01	0.02	0.02
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.05	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Geophysical Exploration	12.80	0.00	12.80	12.40	0.00	12.40	115.00	0.00	115.00	9.20	0.00	9.20
Project Year 2011 Total	4,147.80	3,560.59	7,708.39	2,461.13	1,188.13	3,649.27	8,219.03	3,035.71	11,254.73	5,140.85	128.11	5,268.97

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	43.52	62.63	106.15	21.35	30.72	52.07	3.40	4.89	8.28
Natural Gas Development/Production	1,122.67	1,615.55	2,738.21	5,214.38	7,503.62	12,718.00	532.79	766.70	1,299.48
Oil Development/Production	3.26	4.68	7.94	0.42	0.60	1.02	0.04	0.06	0.10
Locatable Minerals	2.36	3.54	5.90	0.56	0.83	1.39	0.06	0.08	0.14
Salable Minerals	1.21	1.81	3.02	0.35	0.52	0.87	0.03	0.05	0.09
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.42	249.63	390.05	33.28	59.17	92.45	3.33	5.92	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.10	1.95	3.05	0.45	0.80	1.24	0.04	0.08	0.12
Forest and Woodlands	0.33	0.58	0.91	0.10	0.19	0.29	0.01	0.02	0.03
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Geophysical Exploration	81.20	0.00	81.20	14.40	0.00	14.40	0.00	0.00	0.00
Project Year 2011 Total	7,424.74	7,730.19	15,154.93	12,947.29	8,822.28	21,769.56	1,058.68	953.94	2,012.62

Table 4-26. Cumulative Annual Emissions Associated with Alternative C *(Continued)*

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	33.36	48.01	81.38	13.34	19.20	32.55	58.11	83.62	141.73	0.27	0.39	0.66
Natural Gas Development/Production	208.62	300.20	508.82	121.11	174.28	295.38	1,532.18	2,204.85	3,737.03	82.22	118.32	200.54
Oil Development/Production	1.24	1.78	3.02	0.52	0.75	1.27	13.06	18.80	31.86	1.73	2.49	4.22
Locatable Minerals	0.37	0.55	0.92	0.11	0.16	0.27	0.78	1.16	1.94	0.08	0.12	0.20
Salable Minerals	289.11	433.67	722.78	33.52	50.28	83.79	10.29	15.44	25.74	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.68	43.88	68.56	6.31	11.22	17.54	70.45	125.24	195.68	3.91	6.94	10.85
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	1,190.86	2,117.09	3,307.95	178.71	317.70	496.40	0.57	1.02	1.59	0.10	0.18	0.27
Fire Management	0.52	0.93	1.45	0.11	0.19	0.29	0.05	0.09	0.14	0.01	0.02	0.02
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.04	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Geophysical Exploration	12.80	0.00	12.80	12.40	0.00	12.40	115.00	0.00	115.00	9.20	0.00	9.20
Project Year 2020 Total	4,182.51	3,605.96	7,788.47	2,478.45	1,208.48	3,686.93	8,131.20	2,770.62	10,901.82	5,142.53	130.53	5,273.06

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	107.83	155.17	262.99	53.43	76.89	130.33	8.53	12.27	20.80
Natural Gas Development/Production	1,443.79	2,077.64	3,521.43	5,363.93	7,718.82	13,082.75	551.15	793.12	1,344.28
Oil Development/Production	3.27	4.71	7.98	0.42	0.61	1.03	0.04	0.06	0.10
Locatable Minerals	0.60	0.91	1.51	0.39	0.58	0.96	0.04	0.06	0.10
Salable Minerals	0.18	0.27	0.45	0.18	0.27	0.44	0.02	0.03	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.51	57.79	90.29	19.36	34.42	53.77	1.94	3.44	5.38
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	1.46	2.60	4.06	0.33	0.59	0.93	0.03	0.06	0.09
Fire Management	0.92	1.63	2.55	0.27	0.49	0.76	0.03	0.05	0.08
Forest and Woodlands	0.27	0.48	0.76	0.05	0.08	0.13	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Geophysical Exploration	81.20	0.00	81.20	14.40	0.00	14.40	0.00	0.00	0.00
Project Year 2020 Total	7,984.26	8,595.09	16,579.35	13,209.33	9,226.69	22,436.02	1,090.22	1,002.06	2,092.28

BLM	Bureau of Land Management	NO_x	nitrogen oxides	ROW	rights-of-way
CBNG	coalbed natural gas	OHV	off-highway vehicles	SO_x	sulfur oxides
CO	carbon monoxide	PM_{10}	particulate matter less than 10 microns in diameter	VOC	volatile organic compound
HAP	hazardous air pollutant	$PM_{2.5}$	particulate matter less than 2.5 microns in diameter		

Table 4-27. Cumulative Annual Emissions Associated with Alternative D (Proposed RMP)

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011												
CBNG Development/Production	18.52	26.66	45.18	6.23	8.97	15.20	26.20	37.70	63.89	0.20	0.29	0.50
Natural Gas Development/Production	174.55	251.19	425.74	96.70	139.16	235.86	1,227.12	1,765.86	2,992.98	80.41	115.71	196.12
Oil Development/Production	1.06	1.52	2.58	0.50	0.72	1.21	13.00	18.71	31.71	1.72	2.48	4.20
Locatable Minerals	0.32	0.48	0.79	0.19	0.28	0.47	4.54	6.81	11.35	0.04	0.06	0.10
Salable Minerals	289.26	433.89	723.15	33.67	50.50	84.16	14.95	22.42	37.37	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.79	6.73	10.52	0.41	0.74	1.15	0.22	0.39	0.61	0.00	0.00	0.00
ROW Corridors	41.08	73.04	114.12	22.72	40.38	63.10	477.50	848.90	1,326.40	3.91	6.94	10.85
Livestock/Grazing	2.32	4.13	6.46	0.37	0.66	1.03	0.58	1.03	1.62	0.01	0.02	0.03
Renewable Energy	1,190.90	2,117.16	3,308.07	178.75	317.78	496.53	1.91	3.40	5.31	0.10	0.18	0.27
Fire Management	68.43	121.66	190.09	10.30	18.31	28.61	0.27	0.48	0.75	0.01	0.02	0.03
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.05	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.02	0.04	0.00	0.00	0.00
OHVs	14.99	26.65	41.64	14.99	26.65	41.64	6.39	11.36	17.75	0.00	0.00	0.00
Geophysical Exploration	12.80	0.00	12.80	12.40	0.00	12.40	115.00	0.00	115.00	9.20	0.00	9.20
Project Year 2011 Total	4,214.86	3,680.07	7,894.93	2,470.76	1,205.42	3,676.18	8,209.82	3,022.21	11,232.03	5,140.61	127.76	5,268.36

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2011									
CBNG Development/Production	43.52	62.63	106.15	21.35	30.72	52.07	3.40	4.89	8.28
Natural Gas Development/Production	1,117.58	1,608.23	2,725.82	5,176.83	7,449.59	12,626.42	528.98	761.22	1,290.20
Oil Development/Production	3.26	4.68	7.94	0.42	0.60	1.02	0.04	0.06	0.10
Locatable Minerals	1.18	1.77	2.95	0.28	0.42	0.69	0.03	0.04	0.07
Salable Minerals	1.21	1.81	3.02	0.35	0.52	0.87	0.03	0.05	0.09
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.05	0.08	0.13	0.02	0.03	0.05	0.00	0.00	0.01
ROW Corridors	140.42	249.63	390.05	33.28	59.17	92.45	3.33	5.92	9.24
Livestock/Grazing	0.29	0.51	0.80	0.07	0.12	0.18	0.01	0.01	0.02
Renewable Energy	1.75	3.12	4.87	0.36	0.64	0.99	0.04	0.06	0.10
Fire Management	1.16	2.07	3.23	0.46	0.82	1.28	0.05	0.08	0.13
Forest and Woodlands	0.33	0.58	0.91	0.10	0.19	0.29	0.01	0.02	0.03
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	1,220.07	2,169.01	3,389.08	456.85	812.18	1,269.04	45.69	81.22	126.90
Geophysical Exploration	81.20	0.00	81.20	14.40	0.00	14.40	0.00	0.00	0.00
Project Year 2011 Total	7,418.54	7,721.21	15,139.75	12,909.47	8,767.85	21,677.33	1,054.84	948.42	2,003.27

Table 4-27. Cumulative Annual Emissions Associated with Alternative D (Proposed RMP) *(Continued)*

Project Scenario/Resource	Emissions (Tons per Year)											
	PM_{10}			$PM_{2.5}$			NO_X			SO_X		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020												
CBNG Development/Production	33.32	47.94	81.26	13.33	19.19	32.52	58.08	83.58	141.66	0.27	0.39	0.66
Natural Gas Development/Production	207.73	298.93	506.66	120.47	173.36	293.83	1,524.19	2,193.34	3,717.53	81.99	117.99	199.99
Oil Development/Production	1.23	1.78	3.01	0.52	0.75	1.27	13.06	18.80	31.86	1.73	2.49	4.22
Locatable Minerals	0.18	0.28	0.46	0.05	0.08	0.14	0.39	0.58	0.97	0.04	0.06	0.10
Salable Minerals	289.11	433.67	722.78	33.52	50.28	83.79	10.29	15.44	25.74	0.03	0.05	0.08
Coal Mining	452.33	0.00	452.33	157.86	0.00	157.86	1,467.00	0.00	1,467.00	1.67	0.00	1.67
Trona Mining and Processing	1,934.10	598.50	2,532.60	1,934.10	598.50	2,532.60	4,855.10	305.10	5,160.20	5,043.30	2.00	5,045.30
Resource Roads	3.78	6.72	10.50	0.41	0.72	1.13	0.01	0.03	0.04	0.00	0.00	0.00
ROW Corridors	24.68	43.88	68.56	6.31	11.22	17.54	70.45	125.24	195.68	3.91	6.94	10.85
Livestock/Grazing	2.31	4.10	6.41	0.36	0.63	0.99	0.09	0.15	0.24	0.01	0.02	0.03
Renewable Energy	595.98	1,059.52	1,655.50	89.44	159.00	248.44	0.30	0.53	0.83	0.05	0.09	0.14
Fire Management	68.43	121.65	190.08	10.29	18.30	28.60	0.07	0.13	0.20	0.01	0.02	0.03
Forest and Woodlands	8.51	15.14	23.65	1.28	2.28	3.57	0.02	0.03	0.04	0.00	0.01	0.01
Vegetation Management	1.87	3.33	5.20	0.28	0.50	0.78	0.01	0.01	0.02	0.00	0.00	0.00
OHVs	18.04	32.06	50.10	18.04	32.06	50.10	8.48	15.08	23.56	0.00	0.00	0.00
Geophysical Exploration	12.80	0.00	12.80	12.40	0.00	12.40	115.00	0.00	115.00	9.20	0.00	9.20
Project Year 2020 Total	3,654.41	2,667.49	6,321.90	2,398.67	1,066.88	3,465.55	8,122.54	2,758.04	10,880.58	5,142.22	130.06	5,272.28

Project Scenario/Resource	Emissions (Tons per Year)								
	CO			VOC			HAPs		
	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative	BLM	Non-BLM	Cumulative
Project Year 2020									
CBNG Development/Production	107.77	155.09	262.86	53.41	76.85	130.26	8.52	12.27	20.79
Natural Gas Development/Production	1,435.30	2,065.44	3,500.74	5,325.73	7,663.86	12,989.60	547.24	787.50	1,334.74
Oil Development/Production	3.27	4.71	7.98	0.42	0.61	1.03	0.04	0.06	0.10
Locatable Minerals	0.30	0.45	0.76	0.19	0.29	0.48	0.02	0.03	0.05
Salable Minerals	0.18	0.27	0.45	0.18	0.27	0.44	0.02	0.03	0.04
Coal Mining	316.78	0.00	316.78	0.00	0.00	0.00	0.00	0.00	0.00
Trona Mining and Processing	4,489.70	3,617.00	8,106.70	7,204.70	412.85	7,617.55	473.25	94.85	568.10
Resource Roads	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.00	0.00
ROW Corridors	32.51	57.79	90.29	19.36	34.42	53.77	1.94	3.44	5.38
Livestock/Grazing	0.17	0.31	0.48	0.05	0.08	0.13	0.00	0.01	0.01
Renewable Energy	0.77	1.37	2.13	0.17	0.31	0.49	0.02	0.03	0.05
Fire Management	0.96	1.71	2.68	0.29	0.51	0.79	0.03	0.05	0.08
Forest and Woodlands	0.27	0.48	0.76	0.05	0.08	0.13	0.00	0.01	0.01
Vegetation Management	0.05	0.08	0.13	0.01	0.01	0.01	0.00	0.00	0.00
OHVs	1,505.53	2,676.49	4,182.02	551.81	980.99	1,532.80	55.18	98.10	153.28
Geophysical Exploration	81.20	0.00	81.20	14.40	0.00	14.40	0.00	0.00	0.00
Project Year 2020 Total	7,974.77	8,581.20	16,555.97	13,170.77	9,171.14	22,341.91	1,086.27	996.37	2,082.64

BLM Bureau of Land Management
CBNG coalbed natural gas
CO carbon monoxide
HAP hazardous air pollutant
NO_x nitrogen oxides
OHV off-highway vehicles
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compound

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