Appendix 10

Chapter 4 Methodology, Assumptions, Indicators, and Summary of Environmental Consequences

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Appendix 10. Chapter 4 Methodology, Assumptions, Indicators, and Summary of Environmental Consequences

10.1 Introduction

10.1.1 General Methodology for Analyzing Impacts

The discussion of impacts is based on best available data. Knowledge of the planning area and decision area and professional judgment, based on observation and analysis of conditions and responses in similar areas, are used for environmental impacts where data are limited. Acreage figures and other numbers used in the analyses are approximate projections for comparison and analytic purposes only. Readers should not infer that they reflect exact measurements or precise calculations. Potential impacts are described in terms of type, context, duration, and intensity, which are generally defined below.

Type of impact—The analysis discloses impacts, both beneficial and adverse. Because types of impacts can be interpreted differently by different people, this chapter seeks to avoid differentiation between beneficial and adverse impacts. Notable exceptions are cases where such characterization is required by law, regulation, or policy. The presentation of impacts for key planning issues is intended to provide the BLM decision maker and reader with an understanding of the multiple use trade-offs associated with each alternative.

Context—This describes the area or location (site-specific, local, planning area-wide, or regional) in which the impact would occur. Site-specific impacts would occur at the location of the action, local impacts would occur within the general vicinity of the action area, planning area-wide impacts would affect a greater portion of decision area lands, and regional impacts would extend beyond the planning area boundaries. Refer to **Chapter 1** for a description of the planning area and decision area.

Duration—This describes the continuance of an effect, which can be classified as short term or long term. Short-term is defined as anticipated to begin and end within the first 5 years after the action is implemented; long term is defined as lasting beyond 5 years to the end of or beyond the life of this RMPA.

Intensity—Rather than categorize impacts by subjective intensity rankings (e.g., major, moderate, or minor), this analysis discusses the intensity of impacts using quantitative data wherever possible.

Direct, indirect, and cumulative impacts—Direct impacts are caused by an action or implementation of an alternative and occur at the same time and place; indirect impacts result from implementing an action or alternative but usually occur later in time or are removed in distance and are reasonably certain to occur. Cumulative impacts are effects on the environment that result from the impact of implementing any one of the alternatives in combination with other actions, either within the planning area or adjacent to it. Cumulative effects analysis is provided in **Section 4.21**, Cumulative Impacts.

10.1.2 Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA that require federal agencies to identify relevant information that may be incomplete or unavailable for evaluating reasonably foreseeable significant adverse impacts in an EIS (40 CFR Section 1502.21). If the information is essential to a reasoned choice among

alternatives, it must be included or addressed in an EIS. Knowledge and information is, and will always be, incomplete, particularly with infinitely complex ecosystems considered at various scales.

The best available information pertinent to the decisions to be made was used in developing the RMPA. The BLM has made a considerable effort to acquire and convert resource data into digital format for use in the RMPA, both from the BLM and from outside sources.

Under the FLPMA, the inventory of public land resources is ongoing and continuously updated. However, a comprehensive inventory of wildlife and special status species habitat and condition has not been completed across the planning area, and as such, discussions of impacts on potential habitat are included.

For resources where there is incomplete or unavailable information, estimates were made concerning the number, type, and significance of these resources based on previous surveys and existing knowledge. In addition, some impacts cannot be quantified, given the proposed management actions. Where this gap occurs, impacts are projected in qualitative terms or, in some instances, are described as unknown. Subsequent site-specific project-level analysis would provide the opportunity to collect and examine site-specific inventory data to determine appropriate application of RMP-level guidance. In addition, the BLM and other agencies continue to update and refine information used to implement this RMPA.

GIS data was used to perform acreage calculations, and to generate the maps in **Appendix 1**. Calculations are dependent upon the quality and availability of data. Given the scale of the analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate, and serve for comparison and analytic purposes only. Likewise, the maps in **Appendix 1** are provided for illustrative purposes and subject to the limitations discussed above. No warranty is made by the BLM as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

10.1.3 Analytical Assumptions

Several overarching assumptions have been made in order to facilitate the analysis of the project impacts. These assumptions set guidelines and provide reasonably foreseeable projected levels of development that would occur in the planning area during the planning period. These assumptions should not be interpreted as constraining or redefining the management objectives and actions proposed for each alternative, as described in **Chapter 2**.

The following general assumptions apply to all resource categories. Any specific resource assumptions are provided in the methods and assumptions section for that resource.

- Sufficient funding and personnel would be available for implementing the final decision.
- Implementing actions from any of the RMPA alternatives would comply with all federal regulations, BLM policies, and other requirements.
- Implementation-level actions necessary to execute the decisions in this RMPA would be subject to further environmental review, including that under the NEPA, as appropriate.
- Most direct and indirect impacts of implementing the RMPA would primarily occur on BLM-administered lands in the planning area. However, indirect impacts are also likely, such as limiting development on BLM-administered land that may redirect development to other adjacent and nearby non-BLM-administered land.
- Local climate patterns of historic record and related conditions for plant growth may change. Changes to the timing, type, and amount of precipitation will likely occur over the life of this plan.

- In the future, as tools for predicting climate changes in a management area improve and changes in climate affect resources, the BLM would be able to better incorporate climate change into the implementation of projects.
- Restrictions (such as siting, design, and mitigation measures) would apply, where appropriate, to surface-disturbing activities associated with land use authorizations and permits issued on BLM-administered lands.
- Removal of livestock grazing on BLM-administered lands would likely require fences to separate BLM-administered lands from adjacent lands under different surface land ownership.

10.2 GREATER SAGE-GROUSE

10.2.1 Methods and Assumptions

Methodology

Impacts on GRSG would primarily result from management actions described in **Chapter 2** that result in habitat removal, fragmentation, or other alteration, and actions that result in injury or mortality, displacement, or other disturbance. The types of actions that can result in these impacts are discussed in more detail in **Section 4.2.2**, Nature and Type of Effects. For management actions not specifically described below, the effects would remain as described in the 2015 and/or 2019 plans

Indicators

Indicators of impacts on GRSG are as follows:

- Acres of habitat management area within the planning area.
- Habitat loss/degradation – Likelihood for habitat impacts caused by the loss of habitat function or value, including connectivity, and the extent to which it may influence lek and population persistence/ viability.
- Behavioral disturbance to individuals – Likelihood of impacts on survival or reproduction due to direct or indirect effects, including habitat avoidance, and the extent to which it may influence lek and population persistence/ viability.

Assumptions

In addition to the assumptions in **Section 4.1.1**, Analytical Assumptions, this analysis includes the following assumptions:

- GRSG habitat management area designations are assumed to represent habitat adequate to maintain GRSG populations in the planning area.
- Seasonal ranges of migratory and nonmigratory GRSG are largely encompassed within GRSG habitat management area designations.
- GRSG habitat management area designations encompass adequate habitat for providing connectivity within populations and subpopulations. Connectivity is considered by incorporating population area information in the design and implementing restoration projects.
- If adverse impacts are identified, mitigation measures could be implemented to reduce the impacts. If analysis indicates remaining residual impacts, compensatory mitigation may be required. If monitoring reveals that mitigation is unsuccessful in reducing or eliminating impacts, measures to prevent further impacts would be implemented as appropriate to the species affected.
- Short-term effects would occur over a timeframe of 5 years or less, and long-term effects would occur over longer than 5 years.

- BMPs, COAs, and SOPs are used for analysis and would be implemented to reduce impacts on GRSG. These are subject to modification based on subsequent guidance and new science.
- Ground-disturbing activities could modify habitat and cause loss or gain of individuals, depending on the size of the area disturbed, the nature of the disturbance (e.g., development vs. habitat restoration), and the location of the disturbance. For example, habitat restoration treatments in sagebrush steppe disturb the ground but are assumed to positively modify habitat quality and quantity in the long term. Roads, transmission lines, pipelines, and other infrastructure generally cause fragmentation of habitat that can impact lek persistence, lek attendance, winter habitat use, recruitment, chick survival, yearling annual survival rate, and female nest site choice (Holloran 2005; Aldridge and Boyce 2007, Walker et al. 2007a; Doherty et al. 2008; Holloran et al. 2010; Hagen et al. 2011; Johnson et al. 2011; Taylor et al. 2012).
- Because GRSG are highly sensitive to habitat fragmentation, development, and changes in habitat conditions and require large, intact habitat patches, alternatives proposing to protect the most GRSG habitat from disturbance are considered of greatest beneficial impact to the species. These impacts can be described both qualitatively and quantitatively.

10.3 VEGETATION

10.3.1 Methods and Assumptions

Methodology

Impacts on vegetation would primarily result from management actions described in **Chapter 2** that result in vegetation removal, fragmentation, or other alteration. The types of actions that can result in these impacts are discussed in more detail in **Section 4.3.3**, Nature and Type of Effects. For management actions not specifically described below, the effects would remain as described in the 2015 and/or 2019 plans.

Indicators

Indicators of impacts on vegetation are as follows:

Upland and Riparian Vegetation

- Acres and condition of vegetation communities
- Extent of sagebrush or riparian vegetation fragmentation

Noxious Weeds and Invasive Species

- Likelihood for noxious weed or invasive species introduction or spread
- Likelihood for conifer encroachment

Assumptions

This analysis includes the following assumptions:

- All plant communities would be managed toward achieving a diverse native species composition, cover, and age classes across the landscape.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors, including location in the watershed; the type, time, and degree of disturbance; existing vegetation; precipitation; and mitigating actions applied to the disturbance.
- Noxious and invasive weeds would continue to be introduced and spread because of ongoing vehicle traffic in and out of the planning area, recreational activities, wildland fire, wildlife and livestock grazing and movements, and surface-disturbing activities.

- Activities that would disturb soils could cause erosion, loss of topsoil, and soil compaction, which could affect the ability of vegetation to regenerate. Further, surface-disturbing activities could increase dust, which could cover existing vegetation and impair plant photosynthesis and respiration. Resulting impacts could include lowered plant vigor and growth rate, altered or disrupted pollination, and increased susceptibility to disease. These impacts may be reversed by wind or precipitation, which can remove dust from vegetation.
- Ecological health and ecosystem functioning depend on a number of factors, including to but not limited to vegetative cover, species diversity, nutrient cycling and availability, water infiltration and availability, and percent cover of weeds.
- Climatic fluctuation would continue to influence the health and productivity of plant communities on an annual basis.

10.4 WILDLAND FIRE ECOLOGY AND MANAGEMENT

10.4.1 Methods and Assumptions

Methodology

Impacts

Indicators

The indicators of impacts on wildland fire management is: a substantial change in the likelihood or severity of wildfire.

Assumptions

This analysis includes the following assumptions:

- The spread of invasive annuals (e.g., cheatgrass) has lengthened the fire season in many parts of the planning area. These species often cure sooner than native perennial species and are more prone to ignition. Therefore, actions that reduce the spread or footprint of invasive annuals or restore perennial vegetation communities would reduce the frequency and intensity of wildfires, while reducing wildfire management costs.
- Fire is an important functional natural disturbance in many of the ecological systems found in the planning area.
- In many cases, a direct relationship exists between fuel loading and potential fire intensity and severity.

10.5 FISH AND WILDLIFE

10.5.1 Methods and Assumptions

Methodology

Impacts on fish and wildlife species would primarily result from management actions described in **Chapter 2** that result in habitat removal, fragmentation, or other alteration, and actions that result in injury or mortality, displacement, or other disturbance to species. The types of actions that can result in these impacts are discussed in more detail in **Section 4.4.3**, Nature and Type of Effects. For management actions not specifically described below, the effects would remain as described in the 2015 and/or 2019 plans (Colorado 2015 Section 4.3; Oregon 2015 Section 4.5, 2019 Section 4.7; South Dakota 2015 pages 686-725; Utah 2015 Section 4.5, 2019 Section 4.6.6; Wyoming 2015 Section 4.21).

Indicators

Indicators of impacts on fish and wildlife species are as follows:

- Amount and condition of available habitat
- Likelihood of mortality, injury, or direct disturbance
- Likelihood of habitat disturbance

Assumptions

This analysis includes the following assumptions:

- Implementing the management actions for GRSG would have mostly negligible or beneficial impacts on fish and wildlife species. Impacts on fish and wildlife species from resource use actions can have detrimental effects on fish and wildlife, though not all resource uses will have such effects.
- Impacts on big game populations would result from disturbance and/or loss of seasonally important habitat (for example, overwintering, breeding, or migration corridors) to a point that would cause the species' population to decline. Impacts that reduce the population of any herd unit that currently exceeds population objective levels would not be considered significant, so long as impacts would not reduce the population below defined objective levels.
- If adverse impacts are identified, the full suite of mitigation measures could be implemented to minimize, eliminate, or offset the impacts. If monitoring reveals that mitigation is unsuccessful in reducing or eliminating impacts, measures to prevent further impacts would be implemented as appropriate to the species affected.
- Short-term effects would occur over a timeframe of 5 years or less, and long-term effects would occur over longer than 5 years.

10.6 SPECIAL STATUS SPECIES

10.6.1 Methods and Assumptions

Methodology

Although data on many known locations and habitats within the planning area are available, the data are not complete or comprehensive concerning all special status species known or suspected to occur, or potential habitat that might exist. Known and potential special status species and habitats for key special status species that use sagebrush ecosystems in the planning area were considered in the analysis.

As described for Fish and Wildlife in **Section 4.4.2**, impacts on special status species would primarily result from management actions described in **Chapter 2** that result in habitat removal, fragmentation, or other alteration, and actions that result in injury or mortality, displacement, decreased water quality, or other disturbance to species. The types of actions that can result in these impacts would be the same as those described for fish and wildlife species, in **Section 4.4.3** and vegetation, in **Section 4.3.3**. For management actions not specifically described below, the effects would remain as described in the 2015 and/or 2019 plans.

This analysis focuses on a number of key special status species that would have the greatest potential to be affected by the GRSG management decisions outlined in **Chapter 2**. These are typically species that have overlapping ranges with GRSG, and that are closely associated with sagebrush and pinyon-juniper habitats.

Indicators

Indicators of effects on special status species would be the same as those described for Fish and Wildlife in **Section 4.4.1**.

Assumptions

This analysis includes the following assumptions:

- The analysis presented is largely qualitative due to the lack of data or uncertainty in existing data on certain special status species' occurrences. Further, because many special status species may potentially use habitats that are currently unoccupied and populations fluctuate, any quantitative analysis of occupied habitat would change over time as knowledge of species locations increases.
- Impacts on special status species (for example, habitat degradation or direct disturbance) would be more intense than similar impacts on common species. This is because population viability may be already uncertain for special status species, and certain species, such as special status plants, tend to be poor competitors, and habitat may be more limited or fragmented.
- All federal actions would comply with ESA consultation requirements and BLM policy for threatened, endangered, and sensitive species, and all implementation actions would be subject to further special status species review before site-specific projects are authorized or implemented. The USFWS would be consulted on any action that could potentially affect any listed plant or wildlife species or their habitat, including critical habitat.
- The potential for changes to the distribution and extent of special status plant populations and seedbanks.
- Implementing the management actions for GRSG would have mostly negligible or beneficial impacts on other special status species and, therefore, impacts from each alternative are not discussed separately in detail. The key impacts from resource uses, as well as management actions for GRSG, on other special status species are described below.
- If adverse impacts are identified, compensatory mitigation measures could be implemented to minimize or eliminate the impacts. If monitoring reveals that mitigation is unsuccessful in reducing or eliminating impacts, measures to prevent further impacts would be implemented as appropriate to the species affected.
- Short-term effects are defined as those that would occur over a timeframe of 5 years or less, and long-term effects would occur over longer than 5 years.

10.7 WILD HORSES AND BURROS

10.7.1 Methods and Assumptions

Methodology

The following section analyzes impacts on wild horses and burros, including herd management areas and associated AMLs from the potential planning decisions in this document. Under Alternatives 1 through 5, the BLM has proposed various management actions in relation to GRSG habitat objectives, and their analyses are outlined below.

Indicators

Indicators of impacts on wild horses and burros are as follows:

- Changes to population size or AML in mapped GRSG Habitat, changes to forage availability, changes to water resource availability, and climate change
- Ability to perform management activities within herd management areas including gathers and contraceptive activities.

Assumptions

In addition to the assumptions in **Section 4.1.1**, Analytical Assumptions, this analysis includes the following assumptions:

- While wild horses and burros may be found on lands outside herd management areas, these areas have no forage allocated to wild horses and burros. The BLM has no authority to manage wild horses and burros outside of herd management areas, except to remove them.
- Wild horses compete with other wildlife species, including GRSG, for various habitat components. When populations exceed AML or when habitat resources become limited (e.g., reduced water flows, low forage production, or dry conditions), they expand beyond the boundaries of the herd management area.
- Factors contributing to failure to meet Land Health Standards within herd management areas commonly include western juniper encroachment, invasive annual grass and other noxious weed infestations, wildfire, and impacts of livestock and wildlife grazing.
- Population growth suppression (fertility control agents, sterilization, and sex ratio adjustments) can aid in population control, but periodic gathers are still necessary to remove excess wild horses and burros.

10.8 LIVESTOCK GRAZING

10.8.1 Methods and Assumptions

Methodology

The following section analyzes impacts on livestock grazing, including range facilities, and rangeland improvements from the planning decisions in this document. Under Alternatives 1 through 5, the BLM has proposed various livestock grazing management actions in relation to GRSG management objectives, and their analyses are outlined below.

Indicators

Indicators of impacts on livestock grazing are as follows:

- Changes in permitted AUMs in areas available for livestock grazing.
- Prohibitions or limitations of the construction or maintenance of structural and nonstructural range improvements
- Modifications to or removal of structural range improvements
- Changes to the intensity, timing, duration, or frequency of permitted use, including temporary closures.
- Making areas unavailable for livestock grazing

Assumptions

In addition to the assumptions in **Section 4.1.1**, Analytical Assumptions, this analysis includes the following assumptions:

- All new and renewed leases and permits would be subject to terms and conditions determined by the BLM Authorized Officer to manage and achieve resource condition objectives and land health standards for BLM-administered lands.

10.9 LANDS AND REALTY (INCLUDING WIND AND SOLAR)

10.9.1 Methods and Assumptions

Indicators

Indicators of impacts on lands and realty, including renewable energy, are as follows:

- Acres of ROW restrictions (avoidance and exclusion areas) that would limit or preclude new transmission line development to support renewable energy projects

Assumptions

In addition to the assumptions in **Section 4.1**, this analysis includes the following assumptions:

- Existing ROWs, designated utility corridors, and communication sites would be managed to protect valid existing rights.
- On renewal, assignment, or amendment of existing ROWs, permits, and leases, additional stipulations could be included in the land use authorization.
- Major ROWs would be needed to develop and operate renewable energy facilities.
- Maintaining and upgrading utilities, communication sites, and other ROWs is preferred before the construction of new facilities in the decision area, but only if the upgrading can be accommodated within the existing ROW.
- Activities on dispersed private, state, tribal, or non-BLM federal parcels within a decision area would continue to require new or upgraded access, communication, and utility services.
- Federal energy policies including (42 USC Section 13201 et seq. [2005], Executive Order 14008, and the Energy Act of 2020), would continue to support and promote domestic energy production, including renewable energy such as wind and solar.
- The number of ROW applications for new communication and computer technology, such as fiber optic cable, would continue to increase.
- Where demand for new ROWs exists on public lands, restricting ROW development in those areas would likely redirect ROW development to adjacent nonfederal or non-GRSG habitat federal land areas to accommodate the demand where feasible.
- Power lines and other vertical structures in areas naturally devoid of perching opportunities provide a perch for raptors and subsequently increase the potential for GRSG to abandon leks (Johnson and Holloran 2010). Mitigation in the form of burying lines or including non-perching design features on lines could be required to reduce perching opportunities and subsequent impacts on GRSG.
- For all alternatives a major ROWs is defined as a transmission line greater than 100 kV or a 24 inch or larger pipeline, and all others are minor ROWs.

10.10 MINERAL RESOURCES

10.10.1 Fluid Minerals (including Geothermal)

Methodology

The analysis of impacts on fluid minerals focuses on impacts of existing and proposed conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on oil and gas development would result from closing an area to fluid mineral leasing, particularly an area that has moderate to high potential for the development of an oil or gas resource. An indirect impact would result from managing an area as a ROW exclusion, which could prohibit construction of necessary off-lease facilities and access, thereby changing the economic feasibility of developing the leased resource. Additional actions or

conditions that would cause direct or indirect impacts on fluid minerals are described under indicators below.

Indicators

Indicators of impacts on fluid minerals are as follows:

- The amount of land identified as closed to fluid mineral exploration and leasing
- The amount of land open to leasing subject to NSO stipulations
- The amount of land open to leasing subject to CSU stipulations
- The amount of land open to leasing subject to TL stipulations
- Application of COAs on fluid mineral exploration and development activities on existing and future leased lands for the protection of GRSG
- The amount of land managed as ROW avoidance areas
- The amount of land managed as ROW exclusion areas
- The amount of land closed to mineral material disposal

Assumptions

The analysis includes the following assumptions:

- Fluid mineral operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the BLM Authorized Officer and the authorized officer of the surface management agency at the time of APD approval. The BLM and Forest Service can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease. Existing leases would be developed consistent with applicable laws and valid existing rights, using as many of the RDFs and conservation measures as possible while still allowing reasonable opportunities for development. Access to producing leases, including roads and pipelines to those leases, would not be affected by this RMPA.
- Valid existing leases would be managed under the stipulations in effect when the leases were issued; new stipulations proposed under this RMPA would apply only on new leases.
- Under all alternatives, reclamation bonds would be required, pursuant to 43 CFR 3104, in an amount sufficient to ensure full restoration of lands to the condition in which they were found. In addition, APDs, including drilling plans and surface use plans of operations, would be required under all alternatives in accordance with 43 CFR 3162.
- If an area is leased, it could be developed; however, not all leases would be developed within the life of this RMPA.
- As the demand for energy increases, so will the demand for extracting energy resources in areas with potential.
- Technological advancements, such as directional drilling, could lead to changes in levels of fluid mineral development potential throughout the planning area as additional resources become more easily accessible.

10.10.2 Nonenergy Leasable Minerals

Methodology

Analysis of impacts on non-energy leasable mineral development from this EIS focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on non-energy leasable mineral development would result from closure of an area to non-energy

leasable mineral development. An indirect impact would result from removal of a road, which would change the economic feasibility of developing a site. For example, a direct impact of closing lands to non-energy leasable development would be that those mineral resources are not extracted. An indirect impact would be limited or no traffic into and out of the area since those resources are no longer available to develop. Additional actions or conditions that would cause direct or indirect impacts on non-energy leasable minerals are described under indicators below.

Indicators

Indicators of impacts on non-energy solid minerals are as follows:

- The number of acres closed to nonenergy solid mineral leasing
- The number of acres closed to new non-energy leasable surface mining
- The restrictions on surface use or timing placed on non-energy solid mineral leasing
- The restrictions on surface use or timing placed on prospecting and exploration
- Application of RDFs to non-energy leasable development for the protection of GRSG

Assumptions

The analysis includes the following assumptions:

- Nonenergy leasable mineral operations on existing federal leases, regardless of surface ownership, could be subject to RDFs by the BLM Authorized Officer and the authorized officer of the surface management agency. Under these circumstances, existing leases would be developed consistent with applicable laws and valid existing rights, using as many of the RDFs and conservation measures as possible while still allowing reasonable access.

10.10.3 Coal

Methodology

Analysis of impacts on coal development from this EIS focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. Additional actions or conditions that would cause direct or indirect impacts on coal are described under indicators below.

Indicators

Indicators of impacts on coal are as follows:

- The amount of acres identified as unacceptable for coal leasing
- The amount of land surface identified as unsuitable for surface coal mining
- Application of siting, surface disturbance, and TL stipulations on both surface and underground coal mining
- Application of surface disturbance limitations and TL stipulations and reclamation requirements for coal exploration.

Assumptions

The analysis includes the following assumptions:

- If an area is leased, it could be developed. Not all leases would be developed within the life of this RMPA; however, pursuant to 43 CFR 3483, coal leases may be terminated if they are not diligently developed.

- Coal operations on existing federal leases, regardless of surface ownership, could be subject to restrictions on surface disturbance. Under these circumstances, existing leases would be developed consistent with applicable laws and valid existing rights, using as many of the restrictions and conservation measures as possible while still allowing reasonable access.
- As the demand for energy increases worldwide, so will the demand for extracting energy resources in areas with potential.

10.10.4 Locatable Minerals

Methodology

RMP decisions can include those that affect uses related to minerals subject to disposal under the mineral leasing, geothermal leasing, and mineral materials disposal laws; however, no RMP decision can affect the applicability of the US mining laws or uses thereunder. Under section 202(e)(3) of FLPMA, public lands can only be removed from or restored to the operation of the Mining Law of 1872, as amended, by withdrawal action pursuant to section 204 or other action pursuant to applicable law (43 USC 1712(e)(3)). An RMP may recommend an area for withdrawal from location and entry under the U.S. mining laws; however, such recommendation has no legal effect or environmental consequence. Under section 204 of FLPMA, only the Secretary or an individual in the Office of the Secretary who has been appointed by the President, by and with the advice and consent of the Senate, can make, modify, extend, or revoke withdrawals. An RMP recommendation to withdraw an area from location and entry under the U.S. mining laws does not constitute a withdrawal proposal under section 204 of FLPMA, nor does it compel the Secretary to consider such a withdrawal in more detail, or otherwise dictate or limit what areas may be withdrawn.

Despite the lack of legal effect or environmental impact associated with a recommendation in an RMP that the Secretary withdraw any public land from location and entry under the US mining laws, and strictly for the purposes of comparison between the alternatives, this EIS includes a description of the potential environmental consequences of a Secretarial withdrawal of the analysis area from location and entry under the US mining laws. Should the Secretary propose a withdrawal, such proposal would include a legal land description of the land proposed for withdrawal and would be published in the Federal Register for public review and be subject to appropriate analysis under NEPA and FLPMA, including consideration of any relevant mineral potential data.

Indicators

Indicators of impacts on locatable minerals are as follows:

- The amount of land open to mineral entry
- The amount of land recommended for withdrawal from locatable mineral entry
- The designation of areas as ACECs that would trigger the requirement under 43 C.F.R. § 3809.411(c) to file a plan of operations for any surface disturbing activities in those areas greater than casual use

Assumptions

The analysis includes the following assumptions:

- Restrictions on locatable mineral development could only occur through existing legal avenues such as the BLM's mandate to prevent unnecessary or undue degradation (43 CFR 3809). The management actions analyzed for this RMPA would not interfere with valid existing rights.
- Areas recommended for withdrawal would be withdrawn by a public land order issued by the Secretary of the Interior (5,000 acres or less) or by an act of Congress (over 5,000 acres).

10.10.5 Mineral Materials

Methodology

Analysis of impacts on mineral materials focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on mineral materials would result from closure of an area to mineral material sales disposal. An indirect impact would result from removal of a road, which could change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on mineral materials are described under Indicators, below.

Indicators

Indicators of impacts on mineral materials are as follows:

- The amount of land closed to mineral material disposal
- Application of disturbance, timing, and other limitations
- The amount of land over which RDFs would be applied to mineral material disposals
- Application of restoration requirements

Assumptions

The analysis includes the following assumptions:

- Future demand for mineral materials will vary depending upon market conditions, which differ according to economic conditions and construction activity. Construction projects within approximately 50 miles of mineral materials deposits may lead to development of these deposits. It is expected that mineral materials activity will continue at roughly the same level for the life of the RMPA.

10.10.6 Oil Shale and Tar Sands

Methodology

Analysis of impacts on oil shale and tar sands focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact would result from closure of an area to oil shale and tar sand development. An indirect impact would result from removal of a road, which could change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on mineral materials are described under Indicators, below.

Indicators

Indicators of impacts on oil shale and tar sands are as follows:

- Application of conservation measures for GRSG to existing pending leases
- The amount of land managed as ROW avoidance areas
- The amount of land managed as ROW exclusion areas

Assumptions

There are no assumptions specific to the analysis of oil shale and tar sands.

10.11 Special Designations

10.11.1 Methods and Assumptions - Greater Sage-Grouse ACECs

Indicators

Impacts on ACECs would occur from management actions that protect or impair relevant and important values, including "important historic, cultural, or scenic values, fish and wildlife resources or other natural

systems or processes" (BLM Manual 1613, Areas of Critical Environmental Concern). As such, indicators of impacts are allocations for surface-disturbing activities within existing or potential ACECs that could affect the relevant and important values for which the area was designated.

Assumptions

This analysis is based on the assumptions in **Section 4.1.1**. The analysis also includes the following assumptions:

- Management for existing ACECs was determined in the applicable Resource Management Plans to be adequate to support the relevant and important values at the time of their designation. Impacts on these ACECs are not further discussed because the BLM would continue to manage these ACECs to protect their relevant and important values. Management to protect GRSG under the various alternatives could (or would typically) provide additional protections for existing ACECs or provide complementary management.
- Although management actions for most resources and resource uses have rangewide application, ACEC area management prescriptions apply only to those lands within each specific ACEC.
- Permitted activities would not be allowed to impair the relevant and important values for which the ACECs are designated. The exception is locatable minerals; until withdrawn from mineral entry, a mining claim can be filed, and subsequent mining could have an impact.
- ACEC designation provides protection and focused management of relevant and important values beyond that provided through general management of the relevant and important value(s) elsewhere in the rangewide area.
- Any designated ACEC that falls within a Wilderness Study Areas (WSA) would be managed according to BLM Manual 6330, Management of Wilderness Study Areas, unless the ACEC management is more restrictive. Because activities within WSAs must meet the nonimpairment criterion, which generally restricts new surface disturbance, it is assumed that a WSA would generally protect relevant and important values and would have a beneficial effect on overlapping designated and undesignated ACECs. If Congress were to release a WSA from further consideration, the special management in designated ACECs would be designed to protect and enhance the relevant and important values.

10.12 Social and Economic Conditions (Including Environmental Justice)

10.12.1 Methods and Assumptions

Indicators

Fluid Minerals (Oil and Gas)

Potential changes in oil and gas production and development due to the BLM management decisions for the protection of GRSG could impact economic and social conditions. The BLM management decisions could change oil and gas production and development by changing the amount of land closed to fluid mineral leasing, the amount of land open to leasing but subject to NSO, CSU, and TL stipulations, and by changing the COAs on fluid mineral exploration and development activities on existing and future leased lands (see **Section 4.9**, Mineral Resources, for more information), and the potential changes in oil and gas production and development could impact economic and social conditions through the following indicators analyzed in this section:

- Change in economic activity, as measured by jobs, income, economic output, and tax revenue and payments to the state and counties.
- Changes to public services associated with potential impacts on tax revenue.

- Changes to way of life, culture, social cohesion, and preservation of nonmarket values, including direct and indirect use and non-use values, for mineral development and production communities of interest, those involved in local governments, local residents, and other communities of interest that may value access to mineral resources.

Nonenergy Leasable Minerals

Potential changes in nonenergy leasable mineral extraction due to the BLM management decisions could impact economic and social conditions through the following indicators:

- Change in economic activity and market conditions associated with impacts on nonenergy leasable minerals due to change in the amount of land closed to mineral leasing and the amount of land open to leasing but subject to NSO, CSU, and TL stipulations.
- Changes to way of life, culture, social cohesion, and preservation of nonmarket values, including direct and indirect use and non-use values, for mineral development and production communities of interest, those involved in local governments, local residents, and other communities of interest that may value access to mineral resources.

Locatable Minerals

Potential changes in locatable mineral exploration and extraction due to the BLM management decisions could impact economic and social conditions through the following indicators:

- Change in economic activity associated with impacts on locatable minerals due to change in the amount of land withdrawn from mineral entry.
- Changes to way of life, culture, social cohesion, and preservation of nonmarket values, including direct and indirect use and non-use values, for mineral development and production communities of interest, those involved in local governments, local residents, and other communities of interest that may value access to mineral resources.

Mineral Materials

Potential changes in mineral materials exploration and extraction due to the BLM management decisions could impact economic and social conditions through the following indicators:

- Change in public access to mineral materials due to changes in the amount of land closed to mineral materials disposal.
- Changes to preservation of nonmarket values, such as access to clean air and water, health and safety impacts, and visitor and viewer enjoyment from changes in air quality associated with potential changes in mineral materials extraction.

Renewable Energy (Geothermal, Wind, and Solar)

Potential changes in renewable energy production and development, including geothermal, wind, and solar, due to the BLM management decisions could impact economic and social conditions through the following indicators:

- Change in economic activity associated with geothermal production and development, as measured by jobs, income, economic output, and tax revenue and payments to the state and counties, that are due to changes in amount of land closed geothermal leasing and open to leasing but subject to NSO, CSU, and TL stipulations and changes in COAs on geothermal development activities on existing and future leased lands for the protection of GRSG.

- Change in economic activity associated with wind and solar due to changes in the amount of land managed as ROW avoidance and exclusion areas.
- Change in way of life, culture, visitor and viewer enjoyment, and preservation of nonmarket values, including direct and indirect use and non-use values, for local residents and visitors around renewable energy developments as well as communities of interest that value renewable energy.

Livestock Grazing

Potential changes in livestock grazing due to the BLM management decisions, such as changes in acres of land available for livestock grazing, could impact economic and social conditions through the following indicators:

- Change in economic activity, as measured by jobs, income, and economic output, associated with impacts on billed AUMs.
- Change in economic resilience and stability for ranching and farming communities.
- Changes in way of life, culture, social cohesion, and preservation of nonmarket values, including direct and indirect use and non-use values, associated with livestock grazing for ranchers and farmers and their families, local governments, local residents, and other communities of interest that may value livestock grazing on BLM-administered lands.

Greater Sage Grouse Conservation

Changes in greater sage grouse conservation measures due to the BLM management decisions could impact economic and social conditions through the following indicators:

- Changes to nonmarket values, including direct and indirect use and non-use values, associated with GRSG conservation and healthy sagebrush ecosystems, with particular importance for habitat and resource conservation communities of interest and other communities of interest that value the protection of GRSG for use and non-use values.
- Changes to ecosystem services associated with healthy sagebrush ecosystems.

Environmental Justice

As discussed in Appendix 13, Socioeconomic Baseline Report, and Chapter 3 of this EIS, issues of concern for potential impacts on environmental justice populations were identified (see Appendix 13, Socioeconomic Baseline Report and Section 3.11, Social and Economic Conditions (including Environmental Justice) for more details on the issues of concern). These issues were examined to determine if the BLM-management decisions in each alternative result in adverse and disproportionate impacts on the environment, health, and livelihoods of environmental justice populations.

Assumptions and Methodology

A detailed discussion of the specific methodologies used in the impact analysis is provided in **Appendix 18**, Social and Economic Impact Analysis Methodology. In addition to the assumptions provided in that appendix as well as those provided in **Section 4.1.1**, Analytical Assumptions, this analysis includes the general assumptions described below.

Economic and Social Conditions and Values

- Employment and income (especially labor earnings) would continue to be a driver of economic and population change in the socioeconomic study area.
- Activities and resources available in and around the planning area would continue to be important to the quality of life of current and future residents.

- The pace and timing of mineral development activities is dependent on a variety of factors outside the management decisions of BLM and Forest Service. These include national and international energy demand and prices, production factors within the planning area, and business strategies of operators. The RFD scenario projects expected rates of well drilling, completion rates, and production decline curves. Together these parameters allow for projection of future oil and gas production volumes for use in the economic impact analysis. Actual economic impacts could vary if development or production deviates from the projections, if prices change, or if the relationships between industry output, intermediate inputs, and labor productivity change.
- The pace and timing of geothermal, wind, and solar energy development activities is also dependent on a variety of factors outside the management decisions of BLM. These include demand for non-fossil fuel-generated electricity, availability of transmission infrastructure capacity, prices for other energy sources such as coal and natural gas, costs of geothermal, wind and solar energy generation technologies, access and availability of relevant subsidies and incentives, production factors within the planning area, and business strategies of operators. The impacts analysis uses geothermal, wind, and solar deployment scenarios from the RFD. Actual impacts could vary if the rate of development over the study period is different.
- The data collected to calculate projected revenue and well development costs for this impact analysis are based on historical data prior to the passing of the IRA. Revenue and production from new oil and gas leases is expected to change as a result of the changes from the implementation of the IRA, such as the increases in royalty rates and rental rates, which could lead to changes in operational decisions by oil and gas operators.
- While recreation and coal are expected to continue to have impacts on local and regional economic contributions, there are not likely to be impacts on recreation and coal activities and economic contributions across the alternatives from BLM-management decisions related to GRSG. For this reason, economic and social impacts associated with recreation and coal have been dismissed from further analysis. See Section 4.18 and Section 4.9 for more information on BLM-management impacts on recreation and coal, respectively.
- The AML for herd management areas are established in RMPs at the outset of planning and adjusted based on monitoring data throughout the life of the RMP. The BLM management decisions could impact wild horses and burros and the ability of herd management areas to support AMLs within the management areas where management options are restricted for the protection of GRSG; however, aside from the initial removal actions of wild horses and burros, there would be no additional impacts to wild horse and burros within herd management areas, under all alternatives. There could be impacts on wild horses and burros outside of herd management areas in OHMA but in adjacent lands that meander in and out of herd management areas and utilize the resources within, because there is potential for removal of resources, particularly water developments. However, these potential changes due to BLM-management decisions are not expected to impact social conditions or access to social values from wild horses through use and non-use values under all alternatives. For this reason, economic and social impacts on wild horses and burros have been dismissed for further analysis. See Section 4.6, Wild Horses, and Burros, for more information on BLM-management impacts on wild horses and burros.
- Economic and social impacts of BLM-management decisions on oil shale and tar sands was dismissed from further analysis due to the limited amount of oil shale and tar sands extraction on federal lands.

Environmental Justice

- Land use planning level decisions do not result directly in development activities. While this analysis looks at impacts on environmental justice populations from potential changes in development activities due to BLM management decisions, any differences in actual development activities from those included in the discussion below could change the impacts on environmental justice populations. Additional site-specific analysis are required prior to implementation of development activities to determine if and where any disproportionate adverse impacts occur for specific identified environmental justice populations.

10.13 AIR RESOURCES AND CLIMATE

10.13.1 Air Quality

Methodology

Implementation of GRSG conservation measures may indirectly impact air quality, following the assumption that existing operations would remain unchanged and could continue to affect air quality. Future air impacts will be directly evaluated during their individual NEPA processes and air quality impacts will remain unchanged until a project is implemented. The air quality impact analysis focuses on how changes in allowable uses under each alternative would impact air pollution. Since the air quality impact assessments performed for the previous EISs occurred at different times with sometimes differing technical approaches, this analysis will be primarily qualitative. Potential impacts on air quality from implementing Alternatives 2, 3, 4, and 5 are qualitatively compared to Alternative 1, as the No Action Alternative, to determine what changes, if any, can be expected to air quality under each alternative.

Indicators

Indicators of impacts on air quality are as follows:

- Acres closed or subject to stipulations on fluid mineral leasing, and resulting changes in oil and gas production.
- Acres closed to nonenergy solid mineral leasing, mineral entry, and sale or disposal of mineral material resources.
- Area of land with the potential for disturbance due to solar and wind energy development and associated facilities, and from other major and minor ROWs.
- Amount of road traffic from construction, daily operation, and road maintenance.
- Changes in the level of livestock grazing, supporting activities, and range maintenance.
- A substantial change in the likelihood or severity of wildland fire (based on level of restrictions on uses that may introduce sources of ignition)

Assumptions

In addition to the assumptions in **Section 4.1.1**, Analytical Assumptions, this analysis includes the following assumptions:

- Air resource impacts can be localized or regional.
- Weather-related events and wildfires may cause or contribute to local or regional air resource impacts.

10.13.2 Climate Change and Greenhouse Gases

Methodology

Impacts to climate change depend on changes in emission of GHGs and carbon sequestration of the land. Potential impacts on climate change from implementing Alternatives 2, 3, 4, and 5 are qualitatively compared to Alternative 1, as the No Action Alternative, to determine what changes, if any, can be expected to GHG emissions or carbon sequestration under each alternative.

Indicators

Indicators of impacts of climate change include:

- Acres closed or subject to stipulations on fluid mineral leasing, and potential changes in oil and gas production.
- Acres closed to nonenergy solid mineral leasing, mineral entry, and sale or disposal of mineral material resources.
- Area of land managed as open, exclusion, or avoidance areas for renewable energy development and ROWs (e.g., transmission lines).
- Level of road traffic from daily travel and amount of road maintenance and construction activities.
- Changes in permitted AUMs and level of livestock grazing supporting activities (e.g., rangeland improvement or livestock transportation).
- A substantial change in the likelihood or severity of wildland fire (based on level of restrictions on uses that may introduce sources of ignition)

10.14 SOIL RESOURCES

10.14.1 Methods and Assumptions

Methodology

Wide ranging impacts are described because the nature and type of impacts would not change at different levels, though they may be concentrated in different areas based on how surface-disturbing activities are distributed across the landscape and area-specific soil resources. The following activities are considered surface-disturbing and would have similar impacts on soils: minerals development, renewable energy development, and right-of-way (ROW) development.

Indicators

Indicators of impacts on soil resources are as follows for assessing soil productivity and erosion:

- Changes in livestock grazing
- Changes in surface-disturbing activities (minerals development, renewable energy development, and ROW development)
- Changes in vegetation treatments, prescribed burns, and potential for wildfire
- Changes in wild horse and burro management

Assumptions

This analysis is based on the assumptions in **Section 4.1.1**. Also, the analysis includes the following assumptions:

- Soils on BLM-administered lands will be managed to maintain inherent productivity and promote sustained yields, while keeping erosional mechanism at minimal and acceptable levels thus preventing

physical or chemical degradation. Proposed surface-disturbing projects will be analyzed to determine suitability of soils to support or sustain such projects and will be designed to minimize soil loss.

- Achieving or maintaining Standards for Rangeland Health and Guidelines for Livestock Grazing Management (described in **Section 3.7**, Livestock Grazing) generally are effective in managing the effects on soils from livestock grazing when properly implemented and monitored. Grazing authorizations will be adjusted on a case-by-case basis when site-specific studies indicate changes in management are needed.
- BLM management actions and objectives will be consistent with soil resource capabilities.
- Vegetation treatment projects and planned or unplanned wildland fires that contribute to establishing a more natural fire regime would have long-term benefits to soil health. However, wildfire can have detrimental soil health impacts (e.g. in high intensity or sensitive soil types) in some locations or when the disturbance leads to the establishment of invasive plant species.
- Wild horses and burros exceeding AML can degrade soil resources. However, wild horse and burrow management would reduce the impacts on soils.

10.15 WATER RESOURCES

10.15.1 Methods and Assumptions

Methodology

Wide ranging impacts are described because the nature and type of impacts would not change at different levels, though they may be concentrated in different areas based on how surface-disturbing activities are distributed across the landscape and watershed resources. The following activities are considered surface-disturbing and would have similar impacts on water resources: minerals development, renewable energy development, and ROW development.

Indicators

Indicators of impacts on water resources are as follows for assessing water resource conditions, and water quality and quantity:

- Changes in livestock grazing
- Changes in surface-disturbing activities (minerals development, renewable energy development, and ROW development)
- Changes in vegetation treatments, prescribed burns, and potential for wildfire
- Changes in wild horse and burro management

Assumptions

This analysis is based on the assumptions in **Section 4.1.1**. Also, the analysis includes the following assumptions:

- Projects that help restore watersheds, desirable vegetation communities, or wildlife habitats (including surface disturbance associated with these efforts) would benefit water resources over the long term.
- The degree of impact attributed to any one disturbance or series of disturbances would be influenced by several factors. These are proximity to running streams, drainages and groundwater wells, location within the watershed, time and degree of disturbance, reclamation potential of the affected area, vegetation present, precipitation, and mitigating actions applied to the disturbance.
- Areas closed to ROWs, mining, or with NSO stipulations would result in less potential for water erosion and sedimentation to surface water.

- Surface-disturbing actions related to fluid mineral development would comply with Gold Book (BLM 2007) surface operating standards (and subsequent updates), and all federal and state water quality standards.
- Fluid mineral operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the BLM Authorized Officer. The BLM can deny surface occupancy on portions of leases with COAs to avoid or minimize resource conflicts if this action does not eliminate reasonable opportunities to develop the lease or does not affect lease rights.
- The quantity of water stored in the landscape either as surface water or groundwater varies over time depending upon precipitation and human extractions of that water. Management measures that reduce or prevent water use involving mineral development, livestock grazing, wild horses and burros, and pinyon-juniper vegetation would have a net benefit on the quantities of water stored in the landscape.

10.16 CULTURAL RESOURCES

10.16.1 Methods and Assumptions

Methodology

This section focuses on qualitatively describing the impacts that would result from implementing the alternatives. Impacts are described across the entire planning area because the nature and type of impacts would not change at various levels, though they may be concentrated in different areas based on how potentially surface-disturbing and setting-altering activities and actions that increase use or access are distributed across the landscape.

Impacts on cultural resources would primarily be the product of management actions described in **Chapter 2** that result in surface disturbance or alterations in setting, and actions that result in increased resource use or access. There is overlap between them, and impacts can only be described qualitatively and generally without site-specific project details. The types of actions that can result in these impacts are discussed in more detail in **Section 4.15.2**, Nature and Type of Effects.

Indicators

Indicators of impacts on cultural resources are as follows:

- Changes in potential for ground disturbance, including erosion and soil removal.
- Changes in potential for vandalism and collection of cultural resources through changes in access or recreation.
- Changes in potential for impacts to site setting, such as landscape fragmentation, visual disturbance, and noise.

Assumptions

This analysis is based on the assumptions in **Section 4.1.1**. and the following additional assumptions:

- The BLM will follow existing regulatory procedures for the consideration of impacts on cultural resources (for example, Section 106 of the National Historic Preservation Act or relevant program alternatives).
- Nondiscretionary mining notices are not federal undertakings, but 43 CFR 3809 specifically provides for the protection of cultural properties by prohibiting mining operators on claims of any size from knowingly disturbing or damaging these properties.

- Many more sites and resources exist in the planning area than are currently inventoried; this includes traditional cultural properties and other data sets outside existing inventoried cultural data, including but not limited to, knowledge of sites from communities in the planning area.
- Areas of high potential for cultural resource site locations have not been modeled throughout the entire planning area.
- Many sites, inventoried or not, are likely significant for regional and national history, including indigenous sites; however, they have never been evaluated for listing on the National Register of Historic Places.
- This analysis assumes all sites are eligible until evaluated, and they are subject to the impacts discussed.
- Any ground-disturbing activity would be considered a potential threat to cultural resources. Cultural sites are nonrenewable resources, adverse impacts are permanent, and beneficial impacts cannot reverse adverse impacts. Even minor impacts accrue over time, resulting in deteriorating site condition and loss of important scientific data and cultural values.
- Recreation levels and future demand in the planning area are likely to continue increasing (See Section 4.18, Recreation and Visitor Services).
- Implementing the management actions for GRSG would have mostly negligible or beneficial impacts on cultural resources. Impacts from resource use actions would tend to have negligible detrimental effects.
- Degradation of known and undiscovered cultural resources from natural processes (e.g., erosion) would continue regardless of avoidance of human caused impacts.
- Unauthorized or unplanned activities, wildland fire, dispersed recreation, natural processes and unauthorized collection, excavation, and vandalism would lead to impacts that would be difficult to monitor and mitigate. Impacts on traditional cultural properties, sacred sites, historic trails, and some other cultural resources that are significant for reasons other than data potential would be difficult or impossible to mitigate unless the resources and associated settings were avoided.
- Traditional cultural property locations, importance, and nature of use are defined by the communities associated with them. Maintaining access to and reducing impacts on them are responsibilities of the BLM and are important objectives of cultural resource management.

10.17 TRIBAL INTERESTS

10.17.1 Methods and Assumptions

Indicators

The use of indicators in NEPA analysis should provide information on determining the extent or degree to which a tribal interest, resource, or setting is damaged, its physical integrity is lost, or its physical integrity is otherwise adversely affected by a proposed action. However, unlike cultural resources, which have legal criteria for determining the impacts, the impacts on areas or resources of tribal interest and the severity of impacts are dependent upon the perspective and context of the tribe or affected group. In other words, significant impacts would be determined by Indian tribes defining what is culturally or spiritually important to them. When assessing whether the action would have significant impact, the following level-of-effect indicators are carefully considered and consulted upon with tribal representatives:

- Magnitude: The amount of physical alteration or destruction that can be expected. The resultant loss of tribal value is not measurable in quantitative terms, but is described in qualitative summary.
- Severity: The irreversibility of an impact. Impacts that result in an irreversible and irretrievable loss of value are of the highest severity.

- Duration: The length of time an impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on tribal values.
- Range: The spatial distribution, whether widespread or site-specific, of an impact.
- Frequency: The number of times an impact can be expected. For example, an impact of variable magnitude and severity may occur only once. An impact such as that resulting from annual activities, such as road maintenance, may be of recurring or ongoing nature.

Assumptions

In addition to the assumptions in **Section 4.1.1**. this analysis includes the following assumptions:

- Native Americans or other traditional communities may have concerns about federal impacts on cultural resources, religious practices, or natural resource gathering that may occur because of federal actions. In cases where these concerns may be present, consultation would occur with the potentially affected Indian tribes.
- There may be areas of importance to contemporary Native Americans that are not readily identifiable outside of those communities.
- Consultation would continue with Indian tribes to identify any traditional cultural properties or resource uses and address impacts. Through this process, effects would be minimized or eliminated, although residual effects would be possible.

10.18 LANDS WITH WILDERNESS CHARACTERISTICS

10.18.1 Methods and Assumptions

Indicators

Any change in the existing conditions of lands with wilderness characteristics is an indicator of impacts to the inventoried characteristics. Changes in existing conditions could be positive or negative, such as, impacts affecting preservation or degradation of inventoried characteristics.

Indicators of inventoried wilderness characteristics are as follows:

- Size—Projects or management actions that bisect a lands with wilderness characteristics unit so that there are no longer 5,000 acres or more of contiguous BLM lands would change the boundary of the unit and cause the unit to not meet the size requirements. Examples include issuing rights of way and/or constructing or improving roads that would create a wilderness inventory boundary and potentially reduce the size of lands with wilderness characteristics inventoried units.
- Naturalness—Impacts would result from new or a lack of human developments, surface disturbances, or vegetation manipulations that make the area appear to the casual visitor as more or less affected primarily by the forces of nature.
- Outstanding opportunities for solitude or a primitive, unconfined type of recreation—Indicators of impacts that may influence a visitor's solitude include distance between areas of frequent visitation, vegetative screening around the proposed action, topography of the area around the proposed action, attraction of significant additional public visitation, and the ability of visitors to avoid the proposed action and find seclusion in other parts of the inventoried unit. Indicators of impacts that may influence a visitor's opportunity for primitive and unconfined recreation include impairment to the qualities of the primitive and unconfined recreation opportunities to the degree that they would no longer be outstanding. Some examples of primitive and unconfined types of recreation include: hiking, backpacking, fishing, hunting, spelunking, horseback riding, climbing, river running, cross-

country skiing, snowshoeing, dog sledding, photography, bird watching, canoeing, kayaking, sailing, and sightseeing for botanical, zoological, or geological features.

Assumptions

The analysis includes the following assumptions:

- All units identified as possessing wilderness characteristics were determined by the BLM to meet the inventory criteria outlined in BLM Manual 6310 (i.e., size, apparent naturalness, and contain outstanding opportunities for solitude or a primitive and unconfined type of recreation).
- All wilderness characteristics inventories will be maintained and will be updated whenever actions are proposed that could impact BLM-administered lands determined to possess wilderness characteristics.
- The BLM can choose to manage lands with wilderness characters for multiple use rather than the preservation of wilderness character. This analysis addresses the impacts on wilderness characteristics.

10.19 RECREATION AND VISITOR SERVICES

10.19.1 Methods and Assumptions

Methodology

This discussion analyzes the impacts that proposed management decisions would have on managing recreation, recreation opportunities, and the SRP program. Visitor use patterns are difficult to estimate and depend on many factors beyond the scope of management (e.g., recreation trends and economy). For this reason, qualitative language—for example, "increase" or "decrease"—is used to describe anticipated impacts. For information on qualitative socioeconomic impacts on recreation, refer to **Section 4.11**, Social and Economic Conditions (Including Environmental Justice).

Indicators

Indicators of impacts on recreation resources are as follows:

- Change in the types of recreation activities, experiences, and benefits in the decision area
- Restrictions on the number and type of SRPs issued on an annual basis within the decision area

Assumptions

This analysis includes the following assumptions:

- Recreational OHV use will continue to be a recreation activity.
- Recreation activity, particularly recreational OHV use and mountain biking, is expected to increase throughout the life of current RMPs.
- Outside areas where recreation is the management focus, the BLM will manage recreation activities that consist mostly of dispersed activities where users participate in activities individually or in small groups.
- The potential for resource impacts and conflicts between all types of users, but particularly between motorized and nonmotorized users, will increase with increasing use.
- BLM management of areas unsuitable for public utilities (i.e., ROW exclusion areas) preserves recreation opportunities.
- Closure of areas to mineral development decreases the likelihood for conflict with recreation users and maintains desired recreation settings in those areas.

- Outdoor recreation will continue to be an important component of local economies.
- Demand for SRPs will remain steady or gradually increase.
- The BLM will continue to issue SRPs on a discretionary basis.

10.20 TRANSPORTATION AND TRAVEL MANAGEMENT

10.20.1 Methods and Assumptions

Methodology

The analysis of impacts on transportation and travel management is a comparison of the acres that would be managed as open, limited, and closed to OHV use based on the HMA designations under each alternative.

Indicators

The indicator of impacts on transportation and travel management are the acres managed as open, limited, and closed to OHV use.

Assumptions

There are no assumptions specific to transportation and travel management.

10.21 SUMMARY OF ENVIRONMENTAL CONSEQUENCES TABLE

Table 10-1. Summary of Environmental Consequences

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Greater Sage-Grouse					
Restrictions on development, such as WEMs, stipulations and avoidance/exclusion areas, would be applied within HMAs. As a result, energy development, mining, ROWs, and other surface disturbing activities would be focused outside of PHMA. The BLM would incorporate adaptive management, mitigation, disturbance caps, buffers, habitat objectives, and monitoring would reduce the total net impact on GRSG.	Alternative 2 allows for more flexibility in the management of activities that can impact GRSG. The BLM would remove SFA in some states. As a result, there would be more acres of GRSG habitat open to mineral development. This would increase potential for impacts on GRSG and habitat, including disturbance and habitat alterations.	Under Alternative 3 all areas for GRSG would be managed as PHMA. Additionally, management actions for PHMA, such as lek buffers, closures to surface disturbing activities, and managing as unavailable for grazing would be more restrictive and designed to promote GRSG conservation to a greater extent. Applying a 3% disturbance cap at the project scale and within HAF fine-scale boundaries would include protection for both the larger population and individual leks and their surrounding habitat. As a result, this alternative would provide the most protection for GRSG and habitat. However, removal of grazing in PHMA could result in a build-up of fine fuels that may exacerbate a large-scale wildfire that would destroy large areas of GRSG habitat.	Impacts under Alternative 4 would be similar to those under Alternatives 1 and 2, with adjustments based on HMA review or other state-specific considerations. A larger acreage would be managed with an NSO stipulation on fluid mineral leasing, which would reduce impacts associated with this use. The requirement for compensatory mitigation to be completed before projects begin would eliminate any time lag between impacts on habitat and when they are restored.	Impacts from Alternative 5 would be similar to those under Alternative 4, though with less acres managed with NSO stipulations, which could allow for greater disturbance to GRSG or its habitat due to fluid mineral development. Further, compensatory mitigation could be completed after a project has started, which would introduce a time lag during with GRSG habitat would be fragmented and reduced in carrying capacity by project impacts.	Impacts would be the same as described for Alternative 5 but reduced due to additional protections associated with management of ACECs. These include reductions in disturbance and habitat loss from fluid mineral leasing and development due to NSO stipulations and closure to nonenergy mineral leasing and salable minerals, as well ROWs due to ACEC management as ROW exclusion areas.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Vegetation, Fish and Wildlife, and Special Status Species					
Alternative 1 includes restrictions on development, such as land use and surface-disturbing activities that would occur within HMAs and would limit damage to or removal of vegetation; disturbance to fish, wildlife, and special status species; and removal or disturbance to habitats. All states would manage to maintain and enhance sagebrush habitats, which would benefit vegetation as well as some wildlife and special status species which rely on these habitats.	Alternative 2 would result in more areas being open to mineral development and exploration and some areas would remove management of SFAs. This would result in the potential for more impacts on vegetation, fish, wildlife, and special status species from surface-disturbing activities, such as removal, damage, disturbance and habitat fragmentation.	Management of the greatest acreage of PHMA with the most restrictions under Alternative 3 would result in the fewest open acres that could be subject to surface disturbing activities. Such management would decrease the potential for impacts to vegetation, fish, wildlife, and special status species associated with surface disturbing activities. Management of PHMA as unavailable for grazing could benefit biological resources since vegetation would not be trampled or eaten and competition for resources from livestock would be removed. However, the potential for build-up of fine fuels could exacerbate a large-scale wildfire that would destroy large areas of vegetation and habitats.	Impacts under Alternative 4 would be similar to those under Alternatives 1 and 2. With more acres managed as NSO, there would be fewer areas where vegetation could be removed or damaged and fish, wildlife, or special status species could be disturbed or habitats removed or degraded due to fluid mineral leasing and development. Updated management to reflect the latest science would improve management of GRSG habitat and thus vegetation and wildlife and special status species which rely on these habitats.	Impacts would be similar to those under Alternative 4. Under Alternative 5, fewer acres would be managed as NSO, which would allow for more areas where vegetation could be removed or damaged and fish, wildlife or special status species could be disturbed or habitats removed or degraded due to fluid mineral leasing and development.	Impacts would be similar to those under Alternative 5 but reduced due to additional protections associated with management of ACECs. These include reductions in vegetation removal and disturbance and fish, wildlife, and special status species disturbance or habitat removal or degradation from fluid mineral leasing and development due to NSO stipulations and closure to nonenergy mineral leasing and salable minerals, as well ROWs due to ACEC management as ROW exclusion areas.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Wildland Fire Ecology and Management					
Implementation of a comprehensive strategy for wildland fire management, including use of the FIAT, would improve wildland fire management and target those areas that need the most protection. As a result, the likelihood for wildland fire would be reduced.	Impacts would be the same as described for Alternative 1.	Management of PHMA as unavailable for livestock grazing could limit the BLM's ability to achieve resource objectives, such as the reduction of fine fuels. Such limitations could alter the risk of large-scale wildfires.	Impacts would be the same as described for Alternative 1.	Impacts would be the same as described for Alternative 1.	Impacts would be the same as described for Alternative 1.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Wild Horses and Burros					
Restrictions on development under Alternative 1 would benefit wild horses and burros where herd management areas overlap these protections. Habitat conditions and forage would be improved in the absence of development. Temporary, or long-term changes to the management of wild horses and burros may be necessary to achieve and maintain the desired habitat condition and could include reducing AMLs, removing designations of herd management areas, and limiting movement patterns and forage access.	Removal of SFAs under Alternative 2 could lead to additional surface disturbance and removal of forage and disturbance of other resources, such as water sources. This would increase impacts on wild horses and burros when compared with Alternative 1.	Removal of wild horses and burros from herd management areas in PHMA under Alternative 3 would have a long-term impact on wild horses and burros. Wild horses and burros outside of herd management areas in PHMA but in adjacent lands could be impacted by changes in management due to the potential for removal of resources, such as water developments for wild horses and burros or livestock.	Impacts on wild horses and burros under Alternative 4 would be similar to those under Alternative 1, with additional management direction to remove reference to SFAs.	Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management to the low end of the AMLs could reduce wild horse and burro populations in some areas.	Impacts would be similar to those described for Alternative 5. Additionally, management of ACECs would provide further protection to forage for wild horses and burros and disturbance to wild horses and burros from surface disturbing activities.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Livestock Grazing					
Alternative 1 includes restrictions on development, such as land use and surface-disturbing activities that would occur within HMAs and would limit disturbance to livestock and reduction in forage availability.	Under Alternative 2, the BLM would remove management of SFAs in some states and would allow more areas open to mineral development and exploration, thus increasing the potential for surface disturbance and impacts on livestock grazing operations and forage quality and quantity.	Alternative 3 would make all acres of livestock allotments inside of PHMA unavailable for grazing. Removing the ability to graze livestock would directly impact permittees/operators through a reduction in income provided by grazing livestock on BLM lands across the rangewide planning area	Impacts would be similar to those described for Alternatives 1 and 2. With more acres managed as NSO, there would be fewer areas where livestock could be disturbed or forage removed due to fluid mineral leasing and development.	Impacts would be similar to those under Alternative 4. Under Alternative 5, fewer acres would be managed as NSO, which would allow for more areas where livestock could be disturbed or forage removed due to fluid mineral leasing and development.	Impacts would be similar to those under Alternative 5 but reduced due to additional protections associated with management of ACECs. These include reductions in disturbance to livestock or removal of forage from fluid mineral leasing and development due to NSO stipulations and closure to nonenergy mineral leasing and salable minerals, as well ROWs due to ACEC management as ROW exclusion areas.
Lands and Realty (Including Wind and Solar)					
Under Alternative 1, ROWs would be subject to variable restrictions, stipulations, and limitations depending on the state and type of ROW. Impacts in areas where ROWs are restricted would include increased project costs, planning periods, and potential abandonment of future projects.	Impacts would be largely similar to those described for Alternative 1 with some state-specific refinements in HMAs that would change restrictions on ROW developments.	Management of the largest area of PHMA under Alternative 3 compared with the other alternatives and managing PHMA as exclusion for ROWs and renewable energy would prevent ROWs from being developed in many areas and would increase costs or development pressure on neighboring lands.	Impacts associated with Alternative 4 would be less than Alternatives 1, 2, and 3 due to a consistent management approach across the planning area. The impacts would be greater than Alternative 5 due to PHMA and IHMA being managed as avoidance within 0.5 miles of mapped habitat.	Impacts on lands and realty under Alternative 5 would be the least of all of the alternatives due to a consistent approach across the Planning Area and lack of ROW exclusion areas, mitigation measures in corridors, and buffers in areas surrounding HMAs.	Impacts would be similar to those described for Alternative 5. Management of ACECs as ROW exclusion would prevent development in these areas and could increase costs or development pressure in other areas.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Mineral Resources					
Under Alternative 1, mineral resources would be subject to variable restrictions, stipulations, and limitations depending on the state and type of mineral. Impacts in areas where mineral development is restricted would include increased project costs, planning periods, and potential abandonment of future projects. Making PHMA and IHMA NSO would make less land available to mineral entry and leasing. State-specific TLs and lek buffers in GHMA would slow or reduce leasing and development. Management of SFAs would impose restrictions or close areas to fluid mineral leasing and development, nonenergy leasable mineral leasing, coal leasing, locatable, mineral materials, and oil and tar sands.	Impacts would be largely similar to those described for Alternative 1 with some state-specific refinements in HMAs and minerals management that would change restrictions on mineral exploration and development. In general, Alternative 2 would reduce impacts by allowing for more mineral development.	Alternative 3 would have the greatest impact on mineral resource exploration and development by managing the greatest acreage of PHMA of all alternatives and imposing the greatest restrictions and closures in PHMA. This could prevent minerals from being developed in some areas, could increase costs, and could increase development pressure on adjacent lands.	Impacts would be similar to those described for Alternatives 1 and 2, but impacts would likely be reduced due to a more consistent approach to management across the planning area, Impacts on fluid mineral leasing and development would be greater under Alternative 4 since a greater area would be managed with NSO stipulations, which would limit fluid mineral development or increase costs.	Impacts would be similar to those described for Alternative 4. Impacts on fluid minerals would be less under Alternative 5 since fewer acres would be managed with NSO stipulations.	Impacts would be similar to those described for Alternative 5. Management of ACECs would impose greater restrictions on mineral development in some areas, which may increase costs or push development to other lands.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
ACECs and RNAs					
Management of 2 ACECs and 13 key RNAs with important GRSG conservation values in Oregon would continue, including managing all or portions of them as unavailable to livestock grazing.	Impacts would be the same as described for Alternative 1.	Management of additional ACECs under Alternative 3 would result in the greatest restrictions on activities that could degrade relevant and important values, including restrictions on surface-disturbing activities (including minerals development, renewable energy development, and ROW development), and making PHMA unavailable to grazing. This would result in the greatest protections of any alternative for ACEC relevant and important values in the planning area.	Impacts would be the same as described for Alternative 1.	Impacts would be the same as described for Alternative 1.	Management of additional ACECs under Alternative 6 would be similar to those described for Alternative 3, though restrictions on surface-disturbing activities would be less stringent under Alternative 6. As a result, there would be an increased possibility for degradation of relevant and important values in ACECs under Alternative 6.
Social and Economic Conditions					
On annual average, oil and gas production revenue and well development expenditures in the analysis areas across 8 states combined is expected to result in a range of about 73,000 to 94,000 total jobs (from 28,000 to 34,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction	On annual average, oil and gas production revenue and well development expenditures in the analysis areas across 8 states combined is expected to result in about 325 more jobs (almost 100 additional direct jobs), about $27 million more in total labor income (about $11.5 million in additional	On annual average, oil and gas production revenue and well development expenditures in the analysis areas across 8 states combined is expected to result in about 25,000 to 36,000 fewer total jobs (about 11,000 to 14,000 fewer direct jobs), about $2.0 million to $2.9 billion less in total labor income	On annual average, oil and gas production revenue and well development expenditures in the analysis areas across 8 states combined is expected to result in about 9,000 to 10,000 fewer total jobs (about 4,000 to 5,000 fewer direct jobs), about $702 million to $762 million less in total labor income	On annual average, oil and gas production revenue and well development expenditures in the analysis areas across 8 states combined is expected to result in about 560 fewer total jobs to 150 more total jobs (about 460 to 260 fewer direct jobs), about $34 million less in total labor income to $26	On annual average, oil and gas production revenue and well development expenditures in the analysis areas across 8 states combined is expected to result in about 226 to 935 fewer total jobs (about 426 to 626 fewer direct jobs), about $3.1 million to $63.6 million less in total labor income (about

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
sector), $5.8 billion to $7.6 billion in total labor income (from $3.0 billion to $3.8 billion in direct labor income), and about $27.6 billion to $34.2 billion in economic output (from $19.0 billion to $22.8 billion in direct economic output). The projected oil and gas activity throughout the analysis areas, across 8 states, is expected to result in royalty revenue, severance tax revenue, ad valorem tax revenue, and other oil and gas production tax or fee revenues of about $2.9 billion to $3.4 billion, combined. The tax revenues would continue to support public services offered to the communities. Across all states in the planning area, there would continue to be economic and social values associated with nonenergy leasable mineral extraction. There could be economic and social impacts due to current BLM-management decisions	direct labor income), and about $102 million in additional economic output (about $58 million in additional direct economic output) than under Alternative 1. Impacts tax revenues and public services would be the same as under Alternative 1, except in Colorado, where the increase in projected oil and gas activity would likely result in an increase in tax revenues. Across the Colorado analysis area, royalty revenue, severance tax revenue, oil and gas conservation fees, and ad valorem taxes combined are expected to be about $8.6 million to $8.7 million more than under Alternative 1. Impacts on economic and social conditions from nonenergy leasable minerals is the same as under Alternative 1 for all states in the planning area, except Nevada. In Nevada, BLM-management decisions would improve the availability of non-energy	(about $1.2 million to $1.6 billion less in direct labor income), and about $9.2 billion to $12.8 billion less in economic output (about $6.5 billion to $8.5 billion less in direct economic output) than under Alternative 1. The projected oil and gas activity throughout the analysis areas, across 8 states, would result in a large decrease in royalty revenue, severance tax revenue, ad valorem tax revenue, and other oil and gas production tax or fee revenues of about $945 million to $1.3 billion less than under Alternative 1, combined. The reductions in tax revenues would put large strains on local governments' budgets and would impact public services that are offered to the communities. Under Alternative 3, all PHMA would be closed to new nonenergy mineral leasing, which would result in the economic and social impacts as discussed in	(about $482 million to $506 million less in direct labor income), and about $3.5 million to $3.7 million less in economic output (about $2.6 to $2.8 million less in direct economic output) than under Alternative 1. Impacts tax revenues and public services would be the same as under Alternative 1, except in Colorado and Wyoming. Across the Colorado analysis area, the increase in projected oil and gas activity would likely result in an increase in royalty revenue, severance tax revenue, oil and gas conservation fees, and ad valorem taxes of about $39 million to $61 million more than under Alternative 1, combined. Across the analysis area, in Wyoming, royalty revenue, severance tax revenue, oil and gas conservation tax revenue, and ad valorem taxes combined are expected to be about $249 million less than under Alternative 1. The reductions in tax revenues in Wyoming	million more in total labor income (about $47 million to $23 million less in direct labor income), and about $54 million to $279 million less in economic output (about $141 million to $266 million less in direct economic output) than under Alternative 1. Impacts tax revenues and public services would be the same as under Alternative 1, except in Colorado and Wyoming. In the Colorado analysis area, the increase in federal state and local tax revenue and public services from an increase in oil and gas activity would be the same as under Alternative 4. In the Wyoming analysis area, royalty revenue, severance tax revenue, oil and gas conservation tax revenue, and ad valorem taxes combined are expected to be about $42 million less than under Alternative 1. The reductions in tax revenues in Wyoming could put strain on local governments' budgets and could impact public	$42.8 million to $65.5 million less in direct labor income), and about $193 million to $419 million less in economic output (about $241 million to $366 million less in direct economic output) than under Alternative 1. Impacts tax revenues and public services would be the same as under Alternative 5, except in Wyoming where the decrease in projected oil and gas activity would likely result in a decrease in tax revenues. Across the analysis area, in Wyoming, royalty revenue, severance tax revenue, oil and gas conservation tax revenue, and ad valorem taxes combined are expected to be about $50 million less than under Alternative 1. The reductions in tax revenues could put strain on local governments' budgets and could impact public services that are offered to the communities. Impacts on communities of interest are similar to

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
regarding access to nonenergy leasable mineral extractions; however, it is not anticipated that these impacts would be large. Under Alternative 1, all states would recommend the withdrawal of all SFAs, from locatable mineral entry. If these lands were withdrawn, there could be impacts on economic activity and social conditions, as discussed in Nature and Types of Effects; however, it is not anticipated that these impacts would be large. Under Alternative 1, PHMA and IHMA would be closed to new mineral material sales, but open for new free use permits, and expansion of existing pits for both free use permits and material sales. However, extraction could take place in other locations outside of GRSG habitat. Given the other opportunities to extract mineral materials in other locations, the impacts on economic activities and	leasable minerals in the planning areas compared to Alternative 1, which could improve economic and social conditions associated with non-energy leasable minerals, such as lifestyle, culture, employment, and economic output. Alternative 2 does not include recommendations for the withdrawal of SFAs from locatable mineral entry, except in Montana which would continue the recommendation for withdrawal of SFAs as described under Alternative 1. This would likely result in less impacts to jobs, income, economic output and social conditions, as discussed in Nature and Types of Effects, than under Alternative 1. Under Alternative 2, impacts on public access to mineral materials and social and nonmarket values of mineral material extraction would likely be similar to under Alternative 1, for all states except for Idaho	the *Nature and Type of Effects* section. Under Alternative 3, all locatable minerals in PHMA would be recommended for withdrawal from locatable mineral entry. This would likely result in a reduction of the economic activities of locatable minerals, compared with under Alternative 1, as described in the Nature and Type of Effects. Under Alternative 3, all areas managed for GRSG would be PHMA and salable minerals would be closed to disposal in all PHMA. This would likely result in a reduction of the economic activities of mineral materials, compared with under Alternative 1, as described in the Nature and Type of Effects. On annual average, geothermal development in the states in the planning area is expected to result in about 76 fewer total jobs (about 43 fewer direct jobs), $4.3 million less in total	could put strain on local governments' budgets and could impact public services that are offered to the communities. Impacts on economic, nonmarket, and social conditions from changes in nonenergy leasable minerals would be the same as under Alternative 1. Under Alternative 4, there would be no areas recommend for withdrawal from locatable mineral entry. This would likely result in less impacts to jobs, income, economic output and social conditions, as discussed in Nature and Types of Effects, than under Alternative 1. Under Alternative 4, impacts on public access to mineral materials and social and nonmarket values of mineral material extraction would likely be similar to under Alternative 1, for all states, except for Idaho. In Idaho, under Alternative 4, economic and social impacts from proposed management	services that are offered to the communities. Impacts on economic, nonmarket, and social conditions from changes in nonenergy leasable minerals would be the same as under Alternative 1. Impacts on economic, nonmarket, and social conditions from changes in locatable minerals would be the same as under Alternative 1. Impacts on economic, nonmarket, and social conditions from changes in mineral materials would be the same as under Alternative 1. Economic contributions from geothermal activities would be the same as Alternative 1. Economic contributions from wind and solar activities would be the same as Alternative 1. Impacts on economic, nonmarket, and social conditions from changes in livestock grazing would be the same as under Alternative 1.	Alternative 1, with some state analysis area level differences. Impacts on economic, nonmarket, and social conditions from changes in nonenergy leasable minerals would be the same as under Alternative 5, except that any existing non-energy leasable operations within ACECs would not be able to expand on federal mineral estate and no new operations would be permitted in ACECs. This limitation on expansion and new operations would result in the economic and social impacts as discussed in the Nature and Type of Effects section. However, the impacts would be limited to areas within ACECs. Requiring a plan of operations in ACECs would increase administrative process and cost for operators conducting exploration. This could result in a reduction in exploration in ACECs, compared with Alternative 1, which

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
social conditions associated with mineral materials is likely to be minimal, under Alternative 1. On annual average, geothermal development across 7 states in the planning area is expected to result in about 634 total jobs (about 330 direct jobs), $41.2 million in total labor income (about $20.0 million in direct labor income), and about $120 million in economic output (about $28.4 million in direct economic output). Under Alternative 1 the entire plan area with the exception of Wyoming would limit lands used for ROWs in PHMA (or IHMA in Idaho) and GHMA for Greater Sage-Grouse (see Appendix X, Reasonably Foreseeable Development Scenario, for more detail). These BLM-management decisions could result in operators relocating development of wind and solar facilities to other locations that are not restricted. However,	and Nevada. BLM-management decisions in Idaho would allow reduce impacts on road conditions and high road maintenance costs on local governments which would no longer have to transport mineral materials required for road maintenance from outside these areas. Impacts would otherwise be the same as described under Alternative 1. Under Alternative 2, BLM-management decisions in Nevada would increase the time to get approval for new mineral material developments but would also provide certainty about the conditions under which exemptions would be granted, and would reduce social and economic impacts. Economic contributions from geothermal activities would be the same as Alternative 1. Economic contributions from wind and solar activities would be the same as Alternative 1.	labor income (about $2.4 million less in direct labor income), and about $11.5 million less in economic output (about $3.3 million less in direct economic output), compared with Alternative 1. Economic contributions from wind and solar activities would similar to Alternative 1, but impacts may be higher than Alternative 1 due to the highest level of restrictions on solar and wind site development. On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the analysis areas for all states combined is expected to in about 2,000 fewer total jobs (about 841 fewer direct jobs), $120 million less in total labor income (about $67.6 million less in direct labor income), and about $380 million less in economic output (about $204 million less in direct economic output) throughout all states in	and impacts on mineral material development would be the same as described under the Alternative 2 Idaho section. Economic contributions from geothermal activities would be the same as Alternative 1. Economic contributions from wind and solar activities would be the same as Alternative 1. Impacts on economic, nonmarket, and social conditions from changes in livestock grazing would be the same as under Alternative 1. Impacts on nonmarket and social conditions from changes in GRSG conservation vary by state analysis area depending on state specific restrictions on development. Impacts on communities of interest are similar to Alternative 1, with some state analysis area level differences. Under Alternative 4, impacts from BLM-	Impacts on nonmarket and social conditions from changes in GRSG conservation vary by state analysis area depending on state specific restrictions on development. Impacts on communities of interest are similar to Alternative 1, with some state analysis area level differences. Under Alternative 5, impacts from BLM-management decisions on environmental justice populations through cultural resource disturbance would be similar to Alternative 1. Impacts on environmental justice populations from changes in subsistence resource availability would be similar to Alternative 1. Impacts on environmental justice populations from air quality impacts would be reduced, compared with Alternative 1, due to BLM-management decisions that promote project designs that avoid, minimize, reduce,	could lead to a reduction in development and production in these areas as well. If this results in a reduction development, there could be impacts on economic and social conditions in the surrounding communities. Restrictions on mineral material development in ACECs could result in impacts on economic and social conditions, compared with Alternative 1; however, due to mineral materials being available in other locations, the impacts are not anticipated to be large. Economic contributions from geothermal activities would be the same as Alternative 5. Economic contributions from wind and solar activities would be the same as Alternative 5. Impacts on economic, nonmarket, and social conditions from changes in livestock grazing would be the same as under Alternative 5.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
relocating wind and solar operations could result in increased costs if access to transmission lines is limited. On annual average, livestock grazing on allotments where PHMA accounted for at least 15 percent of the acreage in the analysis areas for all states combined is expected to in about 2,000 total jobs (about 841 direct jobs in the animal production and ranching sectors), $120 million in total labor income (about $67.6 million in direct labor income), and about $380 million in economic output (about $204 million in direct economic output) throughout all states in the planning area combined. Management restrictions for grazing may be applied to protect GRSG habitat, with potential to increase time and costs for management.	Impacts on economic, nonmarket, and social conditions from changes in livestock grazing would be the same as under Alternative 1. Impacts on nonmarket and social conditions from changes in GRSG conservation would generally be the same as Alternative 1, with some additional differences across states. Impacts on communities of interest are similar to Alternative 1, with some state analysis area level differences. Impacts on environmental justice populations from BLM-management decisions on cultural resources, access to subsistence resources, air quality, water quality, and climate change would be similar to under Alternative 1, except for areas with fewer restrictions on fluid mineral development, fewer areas withdrawn from locatable mineral entry, more allocable	the planning area combined, compared with Alternative 1. Lowest level of support for livestock grazing and WHB non-market values as a result of no permitted use for grazing in PHMA Highest level of support for GRSG conservation related non-market values due to limitations on development and resources uses Highest potential for impacts to groups associated with development, greatest level of support for those associated with conservation values Under Alternative 3, impacts on environmental justice populations from impacts on cultural resources, access to subsistence resources, air quality, water quality, and climate change would be the lowest compared with all other alternatives.	management decisions on environmental justice populations through cultural resource disturbance would be similar to Alternative 1. Impacts on environmental justice populations through subsistence resource availability could be reduced due to BLM-management decisions on minerals. Under Alternative 4 impacts on air quality from mineral development may increase compared with Alternative 1 due to the wavers, exceptions, and modifications that would be allowed, which would likely result in adverse and disproportionate impacts on environmental justice populations. Under Alternative 4 impacts on climate change from mineral development may increase compared with Alternative 1 due to the wavers, exceptions, and modifications that would be allowed, which would	rectify, and compensate for indirect impacts. Impacts on environmental justice populations from changes in water quality would be the same as Alternative 4. Impacts on environmental justice populations from changes in climate change would be the same as Alternative 4.	Impacts on nonmarket and social conditions from changes in GRSG would be the same as under Alternative 5. Impacts from BLM-management decisions on environmental justice populations would be the same as under Alternative 5.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Non-market value of GRSG conservation would remain supported at current conditions and would vary by analysis areas depending on the disturbance cap and adaptive management approach. Some continued support for conservation based groups on GRSG habitat specific measure. Support for business development due to continued mineral and energy development and livestock grazing. Under Alternative 1, there could be impacts on environmental justice populations from BLM-management decisions through impacts on cultural resources, access to subsistence resources, air quality, water quality, and climate change. These impacts would likely result in disproportionate and adverse impacts on environmental justice populations.	permits for salable minerals and/or more exceptions to restrictions on livestock grazing. These impacts could disproportionately and adversely impact environmental justice populations, compared with Alternative 1.	Under Alternative 3, BLM-management decisions regarding restrictions on mineral development and livestock grazing could have adverse impacts on prices and availability of food and household products. These impacts would disproportionately affect low-income environmental justice populations due to food and household products purchases making up a larger percentage of the disposable income and fewer alternative resources available.	likely result in adverse and disproportionate impacts on environmental justice populations.	*(See above.)*	*(See above.)*

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Air Resources and Climate Change					
Alternative 1 would continue current impacts on air quality and climate change. This is because the alternative does not change BLM management that can impact air quality or climate change (through GHG emissions and carbon sequestration). Such management includes livestock grazing, surface-disturbing activities (including minerals development, renewable energy development, and ROW development), and changes in the potential for wildfire.	Alternative 2 would result in increased air quality impacts from fugitive dust generation and exhaust emissions compared with Alternative 1. Alternative 2 would also result in increased climate change impacts due to changes in GHG emissions and carbon sequestration and storage potential of the land, when compared with Alternative 1. This is because this alternative would have fewer restrictions on mineral development and exploration as well as renewable energy development and major ROW projects. This would result in an increase in surface disturbance that creates dust and reduces carbon sequestration and storage of the landscape. In addition, there would be more direct emissions of criteria and hazardous air pollutants and GHGs into the atmosphere.	Alternative 3 has the most restrictions on emission-producing and surface disturbing activities from livestock grazing, minerals exploration and development activities, renewable energy development, roads, and other major ROWs, and changes in potential for wildfire. This would result in the least amount of surface disturbance and dust generations, as well as the smallest emission of criteria and hazardous air pollutants and GHG emissions. Managing PHMA as unavailable for grazing could lead to a build-up of fine fuels that could exacerbate a large-scale wildfire that would result in a reduction in carbon storage potential and an increase in carbon dioxide into the atmosphere.	Alternative 4 would implement an adaptive management approach that is based on the best available data and science and through mitigation and design features that minimize impacts. This could reduce impacts on air quality and climate change in some areas. In addition, a greater acreage would be managed with NSO stipulations under Alternative 4, which would prevent some surface disturbance associated with fluid mineral leasing and development that could cause dust generation and emission of criteria and hazardous air pollutants and GHGs.	Impacts would be similar to Alternative 4. However, Alternative 5 would be less restrictive than Alterative 4 in terms of allowing for mineral and renewable energy development. Therefore, there is the potential for greater dust generation and emission of criteria and hazardous air pollutants and GHGs under Alternative 5.	Impacts would be similar to those under Alternative 5. Management of ACECs under Alternative 6 would restrict some surface-disturbing activities, which could reduce potential sources of pollutants and GHGs.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Soil and Water Resources					
Alternative 1 would continue current impacts on soil productivity and erosion and water resource conditions. This is because the alternative does not change BLM management that can impact soil, such as livestock grazing, surface-disturbing activities (including minerals development, renewable energy development, and ROW development), and the potential for wildfire.	Alternative 2 would result in fewer restrictions on activities that could cause soil compaction and erosion compared with Alternative 1. This is because the alternative allows for more flexibility in the management of activities that can impact soil and water, particularly changes in surface-disturbing activities (including minerals development, renewable energy development, and ROW development.	Alternative 3 would result in the greatest restrictions on soil- and water-disturbing activities, particularly surface-disturbing activities (including minerals development, renewable energy development, and ROW development). This would result in the greatest protections of any alternative for soil and water conditions in the planning area. Managing PHMA as unavailable for grazing could lead to a build-up of fine fuels that could exacerbate a large-scale wildfire that would degrade soil and water conditions in many areas.	Impacts would be similar to those described for Alternatives 1 and 2. However, a greater acreage would be managed with NSO stipulations under Alternative 4, which would prevent some surface disturbance associated with fluid mineral leasing and development that could degrade soil and water conditions.	Impacts would be similar to Alternative 4. However, Alternative 5 would be less restrictive than Alterative 4 in terms of allowing for mineral and renewable energy development. Therefore, there is the potential for greater degradation of soil and water conditions under Alternative 5.	Impacts would be similar to those under Alternative 5. Management of ACECs under Alternative 6 would restrict some surface-disturbing activities, which could reduce potential activities that would degrade soil and water conditions.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Cultural Resources and Tribal Interest					
Alternative 1 would result in a continuation of current impacts on cultural resources and areas of tribal interest from GRSG management decisions regarding activities such as mineral development, renewable energy development, livestock grazing, and ROW location. Management could shift ground-disturbing activities in the planning area out of GRSG habitat and into other landscapes such as pinyon-juniper vegetation where known concentrations of resources important to tribes are known to exist.	Under Alternative 2, potential for impacts on cultural resources and areas of tribal interest is similar in magnitude, but likely greater than under Alternative 1 due to increased potential for mineral and renewable energy development, as well as increased potential for ROW location in PHMA. This alternative could increase the range and magnitude of impacts on cultural resources and areas of tribal interest as compared to Alternative 1.	Due to the most robust restrictions and highest acreage of PHMA, Alternative 3 would offer the greatest restrictions on surface disturbing activities such as minerals development, renewable energy development, and ROW location. This alternative would result in the lowest potential for impacts on cultural resources and areas of tribal interest in the planning area.	Impacts would be similar to those described for Alternatives 1 and 2. However, a greater acreage would be managed with NSO stipulations under Alternative 4, which would prevent some surface disturbance associated with fluid mineral leasing and development that could degrade cultural resources or areas of tribal interest.	Impacts would be similar to Alternative 4. However, Alternative 5 would be less restrictive than Alterative 4 in terms of allowing for mineral and renewable energy development. Therefore, there is the potential for greater degradation of cultural resources or areas of tribal interest under Alternative 5.	Impacts would be similar to those under Alternative 5. Management of ACECs under Alternative 6 would restrict some surface-disturbing activities, which could reduce potential activities that would degrade cultural resources or areas of tribal interest.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Lands with Wilderness Characteristics					
Impacts on lands with wilderness characteristics under Alternative 1 would continue from mineral and ROW development and infrastructure, and livestock grazing.	Alternative 2 would allow more areas to be open to mineral development and ROW authorizations, causing greater impacts on lands with wilderness characteristics when compared with existing management under Alternative 1.	Alternative 3 would have the overall greatest potential to maintain wilderness characteristics on lands with wilderness characteristics when compared to all other alternatives due to the closure of fluid, salable, and nonenergy mineral leasing, ROWs being managed as exclusion, and PHMAs being unavailable for livestock grazing.	Impacts would be similar to those described for Alternatives 1 and 2. However, a greater acreage would be managed with NSO stipulations under Alternative 4, which would prevent some surface disturbance associated with fluid mineral leasing and development that could degrade wilderness characteristics.	Impacts would be similar to Alternative 4. However, Alternative 5 would be less restrictive than Alterative 4 in terms of allowing for mineral and renewable energy development. Therefore, there is the potential for greater degradation of wilderness characteristics under Alternative 5.	Impacts would be similar to those under Alternative 5. Management of ACECs under Alternative 6 would restrict some surface-disturbing activities, which could reduce potential activities that would degrade wilderness characteristics.

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Recreation and Visitor Services					
Under Alternative 1, existing restrictions on other resource uses would indirectly affect recreation by reducing resource conflicts and preserving recreational experiences. Management of ROW avoidance areas would continue to improve recreation experiences in the long-term in PHMA and IHMA as these diminish the naturalness of the physical setting and opportunities for recreation.	Under Alternative 2, additional exceptions to restrictions on other resource uses would indirectly increase recreation conflicts with other resources, which would diminish recreational experiences in those areas. Management of fewer acres of PHMA and IHMA compared to Alternative 1 would restrict fewer acres for the construction of new recreation facilities.	Alternative 3 would impose the greatest restrictions on other resources, which would have the great potential for enhancing and preserving the recreation experience by reducing resource conflicts. More acres of ROW exclusions would prohibit developments over a greater area, maintaining the naturalness and remoteness for recreation experiences. Alternative 3 would also have the greatest acreage of PHMA, thus, prohibiting the greatest area for the construction of new recreation facilities compared to other alternatives.	Like Alternative 1, Alternative 4 would have an indirect effect on recreation by reducing resource conflicts in PHMA, IHMA, and GHMA with existing restrictions on other resource uses, which would preserve the recreational experiences in those areas. ROWs would have additional criteria for avoidance of GRSG, which would enhance naturalness and remoteness for recreation experiences in the area. There would be more acres of PHMA and IHMA compared to Alternative 1 which would restrict more fewer acres for the construction of new recreation facilities.	Impacts on recreation from Alternative 5 would be similar to Alternative 4; however, on ROWs, there would be less restrictive criteria for avoidance of GRSG when compared to Alternative 1. These fewer restrictions would indirectly affect recreation by decreasing the naturalness and remoteness for recreation experiences in the area.	Impacts would be similar to those under Alternative 5. Management of ACECs. Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, non-energy minerals, and mineral materials as well as major ROWs, wind and solar, which would indirectly decrease the resource conflicts that also affect recreation resources when compared to Alternative 1.
Transportation and Travel Management					
Management of PHMA as limited to OHV existing routes would continue to restrict OHV travel in these areas.	Since fewer areas would be managed as PHMA, fewer acres would be limited to existing routes under Alternative 2.	Management of the greatest acreage of PHMA under Alternative 3 would result in the greatest acreage where travel would be limited to existing routes.	More acreage would be managed as PHMA compared with Alternatives 1 and 2, which would result in more acres limited to existing routes under Alternative 4 but less than Alternative 3.	More acreage would be managed as PHMA compared with Alternatives 1 and 2, which would result in more acres limited to existing routes under Alternative 5 but less than Alternatives 3 and 4.	Impacts would be the same as Alternative 5.