Appendix 10

Chapter 4 Methodology, Assumptions, Indicators, and Environmental Consequences for Alternatives 1-6

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Appendix 10. Chapter 4 Methodology, Assumptions, Indicators, and Environmental Consequences for Alternatives 1-6

10.1 Introduction

This section provides an overview of the general methodology used to analyze impacts, discusses incomplete or unavailable information, outlines the analytical assumptions applied, and provides the environmental consequences for Alternatives 1-6 for each resource analyzed in this EIS.

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, regardless of who is taking or has taken that other action. 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 BLM used the best available information pertinent to the decisions to be made in developing the RMPA. The BLM 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 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 were made 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 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.
- When used in the EIS, the terms "mineral development" or "mineral resource development" refer broadly to development of a range of minerals, including fluid minerals, nonenergy leasable minerals, saleable minerals, and locatable minerals. Elsewhere, the analysis specifies a given type of mineral as applicable.
- Removal of livestock grazing on BLM-administered lands may require fences to separate BLM-administered lands from adjacent lands under different surface land ownership to prevent trespass.

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 4.2.1**, 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. 2007; 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.

10.2.2 Alternative 1

Habitat Designation and Management

Rangewide Environmental Consequences

Under Alternative 1, GRSG habitat is separated into SFAs, PHMA, GHMA, and other HMAs for certain states (see **Table 2-3**). Restrictions to land use and surface-disturbing activities would occur within each HMA and SFA, depending on the classification (see **Chapter 3**). Corresponding management actions, including lek buffers, required design features, fluid mineral leasing prioritization, and habitat objectives, would provide a hierarchy of potential conditions to minimize effects in HMAs. Withdrawal from location and entry under the US mining laws, subject to valid existing rights, would be recommended for lands within SFAs to promote protection of GRSG and its habitat. If the Secretary approves the proposed withdrawal, management for SFAs would provide the highest level of protection to GRSG. The lack of WEMs in SFAs, even for actions that would benefit GRSG, could limit habitat improvements. In general, restrictions to land use and surface-disturbing activities in HMAs and SFAs reduce the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. Effects from specific restrictions associated with each resource use are described in the sections below. However, restrictions to development on BLM lands might push development onto private land, which could result in indirect impacts as described under *Nature and Types of Effects*. In most cases management actions for state-specific HMA (IHMA, OHMA, etc.) would be consistent with those for PHMA; where differences occur, they are analyzed under *State-Specific Environmental Consequences*. Alternative 1 includes lek buffers for all HMAs. These buffers are consistent with the lek buffer distances identified in the USGS Report, *Conservation Buffer Distance Estimates for Greater Sage-Grouse - A Review* (a 1-mile buffer would be used as the minimum threshold in Colorado). Modifications to

the buffer distances are allowed if they meet the criteria outlined in the report. Lek buffers would reduce disruption to GRSG, minimize habitat loss, and reduce habitat degradation, and should contribute to maintaining nesting habitat effectiveness and brood survival.

Alternative 1 incorporates an adaptive management strategy composed of soft and hard triggers based on population and habitat changes. BLM would rely on data from several sources to track and identify population changes to assess the population trigger in the adaptive management approach. Triggers would be determined by population area, making the strategy more locally responsive than if triggers were determined on a sub-regional or statewide basis. Responses to soft triggers may require adjustment of future project level/plan implementation activities, as consistent with the individual site-specific NEPA analyses. Soft trigger responses can come in the form of terms, conditions, RDFs, or site-specific mitigation measures. Hard triggers mean that immediate action is necessary to stop a severe deviation from conservation objectives set forth in the Proposed RMP Amendment. If new scientific information becomes available demonstrating that the hard-wired response would be insufficient to stop a severe deviation from sage-grouse conservation objectives set forth in the ARMPA, BLM will implement interim management direction to ensure conservation options are not foreclosed. BLM will also undertake plan amendments or revisions if necessary. The use of adaptive management would benefit GRSG by allowing flexible resource management decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. If management changes are successful, they would reduce impacts to GRSG by limiting disturbances and improving habitat conditions. BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types and in all states (except WY GHMA). Mitigation should offset any loss of GRSG habitat resulting from land use activities.

Under Alternative 1, all states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. Habitat objectives would be considered when authorizing activities in GRSG habitat. The exact language varies by state, but in general, inclusion of specific habitat objectives could result in increased certainty and greater levels of consistency when considering implementation-level actions. Following these objectives could prevent activities such as improper grazing practices and result in increased habitat quality. Improved habitat conditions would increase nest success, chick survival, and GRSG persistence over the long term.

State-Specific Environmental Consequences

There could be impacts to GRSG in WY GHMA associated with land use activities as described under *Nature and Types of Effects*. No mitigation would be required in WY GHMA.

In CO, ID, NV/CA, OR, and UT, a 3% disturbance cap would apply to land use activities (except wildfire and agriculture) at both biologically significant unit (BSU)-scale and at proposed project analysis area within PHMA. In ID, the same cap would apply but it could be exceeded in utility corridors if it benefits GRSG. Calculating disturbance at the project-level may prevent some development that could occur if disturbance is only calculated at a coarser scale. Disturbance would also be calculated for each BSU. The definition of a BSU would vary by state, but in general, a BSU is defined as a spatial area that contains relevant and important GSRG habitats and is used for comparative calculations to support evaluation of changes to habitat. Including caps at both project and BSU scales would reduce disturbance on both the local and landscape scales, therefore, provide protection for both the larger population and individual leks and their surrounding habitat.

Excluding wildfire and agriculture from the disturbance calculation for those states listed above may result in a higher level of disturbance overall. Since wildfire was the primary source of habitat loss in previous years (Herren et al. 2021), this may contribute to continued declining habitat trends. Wildfire and agriculture are

factored into the soft and hard habitat triggers and included as part of the HAF boundary and 70% sagebrush cover habitat objective; if these disturbances lead to the trip of a trigger, adaptive management would be applied to reverse the trends. In PHMA and IHMA, the Anthropogenic Disturbance Screening Criteria would apply stringent criteria to any proposed projects. No disturbance cap would apply in GHMA or GRSG brood-rearing habitat and migration corridors.

Managing RHMA in MT would add protections to GRSG in those areas. Management actions in RHMA would emphasize restoration for the purpose of restoring habitat to provide the ability for establishing or enhancing GRSG populations to sustainable, dense levels. Management in RHMA that leads to restrictions to land use and surface-disturbing activities would reduce the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. The restoration focus in RHMA would further improve GRSG habitat. The higher disturbance cap in MT, WY, and the Dakotas could lead to greater levels of anthropogenic disturbance within a project area, and therefore greater potential for habitat loss and alterations as well as direct disturbance to GRSG, depending on the degree to which wildfire and agriculture contribute to disturbance in a given area. Disturbance will only be calculated at the project level, so cumulative disturbance over a larger area could potentially occur at levels that influence GRSG populations within a BSU. In areas with reduced habitat due to wildfire and/or agriculture, additional anthropogenic development would be limited, reducing the combination of threats and habitat degradation.

Although all states would include an adaptive management strategy, the metrics, thresholds, timeframes, and spatial scales for evaluating and responding to triggers would vary state by state. As a result, there would be no consistency in how triggers are calculated across the range and responses may not be implemented across an area that encompasses an entire population group and/or seasonal habitats needed throughout the year. If management changes do not apply to all populations and habitats being affected, some individuals and/or habitat areas may improve while others remain impacted.

In UT, the GHMA identified in Alternative 1 generally comprises poor-quality habitat on the periphery of larger PHMA. The extent to which some of these GHMA areas may provide connectivity, be used as corridors, or provide certain seasonal habitat during portions of a bird's life cycle is largely unknown due to limited telemetry. Most of these GHMA areas are predominantly private, Tribal, and TLA lands, and because of the limited regulatory discretion (other than split estate where BLM administers the mineral estate) that the BLM has on resources in these areas impacts on GRSG from development are likely to continue at current rates. Only 6 of the 13 leks in GHMA are in areas affected by BLM management, with the other 7 in areas predominantly managed by USFS, tribal, or private entities. Development could still occur in UT GHMA potentially resulting in alteration, direct loss, and fragmentation of seasonal GRSG habitats. Fragmentation could further limit the amount of usable habitat available for the small and declining population of GRSG that occupy GHMA.

Minerals Management

Rangewide Environmental Consequences

Leasing of fluid minerals would be allowed in PHMA and ID IHMAs, subject to NSO stipulations and/or seasonal restrictions. This would increase HMA acres subject to effects from fluid mineral development compared to alternatives in which PHMA would be closed to leasing. In SFAs, there would be no exceptions, waivers, or modifications allowed. In PHMA outside of SFAs, no waivers or modifications would be allowed but exceptions could be considered on a very limited basis, and only in circumstances where granting an exception would have either have no impacts or would reduce impacts on GRSG.

NSO stipulations on new leases would protect PHMA from surface-disturbing activities on BLM lands. In large contiguous areas primarily managed by the BLM, GRSG exposure to disruption would be limited to the human activity that accompanies construction, development, or production activities. Access to fluid mineral deposits would require horizontal drilling from outside the boundaries of the NSO area. In areas of mixed ownership, impacts could still occur due to directional/horizontal drilling NSO on BLM lands may encourage co-location of leases, which could help prevent fragmentation and preserve connectivity between leks by concentrating effects outside of PHMA.

PHMA in all states would be closed to saleable mineral development (except where authorized in MT and open subject to restrictions in WY), but open for new free use permits (except ID). PHMA in all states and ID IHMAs would be closed to nonenergy mineral development, but they could consider expansion of existing leases. Most states would include minimization measures for saleable mineral and nonenergy mineral development in GHMA, but they were not recommended for withdrawal. These are described in the 2015 EISs for CA, CO, ID, MT/DK, NV, OR, UT, and WY (BLM 2015a-2015h). SFAs in all states were recommended for withdrawal from location and entry under the United States mining laws, subject to valid existing rights. Following publication of the RODs, the BLM applied for a withdrawal of the SFAs, pursuant to section 204 of FLPMA. The Secretary accepted the BLM's application and the BLM initiated the withdrawal process for those lands; the EIS for the withdrawal is underway. These restrictions would reduce the HMA acres affected and potential impacts to GRSG and habitat within PHMA and GHMA, such as disturbance and habitat alterations. Indirect effects on wildlife include noise, dust, and light impacts resulting from locatable mineral development and associated transportation.

State-Specific Environmental Consequences

In WY, applying an NSO within 0.6 miles of occupied GRSG leks in PHMA would protect fewer areas than in other states. Buffer distances from 0.5 to two miles from oil and gas infrastructure have been shown to be inadequate to prevent declines of birds from leks (Walker et al. 2007a). Studies have shown that greater distances, anywhere from two to four miles, are required for viable GRSG populations to persist (Walker et al. 2007a).

In WY and MT PHMA, fluid mineral development in areas that are already leased (and thus are exempt from NSO stipulations) would also be subject to density and disturbance limits, which would limit the extent of development and associated impacts. GHMA would be subject to NSO stipulations for fluid mineral development within 2 (CO), 1 (OR) or 0.25 (WY) miles of leks. GHMA in UT would also be subject to NSO stipulations but the distance varies by BLM office. PHMA and GHMA in CO and GHMA in OR would be closed to fluid mineral development within 1 mile of leks; this would provide increased protections to GRSG and contribute to lek persistence because no development (surface or subsurface) could occur. Fluid mineral development would be subject to Controlled Surface Use (seasonal restrictions and/or buffers) stipulations in ID, NV/CA OR, and WY GHMA. MT-DK would include a 0.6-mi NSO in GHMA and seasonal limitations (breeding, nesting, early brood-rearing & winter habitat) and CSU (density and disturbance) for the rest of the GHMA. Applying these restrictions to fluid mineral development would reduce potential impacts to GRSG associated with fluid mineral development.

Development of fluid mineral resources in GHMA would still result in the localized direct loss and fragmentation of seasonal habitats and displacement of GRSG from current use areas outside of the applicable lek buffers. The general effects of fragmentation, habitat loss, and displacement are discussed in *Nature and Types of Effects*. Application of lek buffers as required conservation measures or COAs would protect lekking, most nesting, and some brooding habitat; however, nesting and brooding habitat located

outside of the buffer would be afforded no specific protections other than the restrictions associated with management of PHMA and GHMA. Impacts of development outside buffer areas could be offset by mitigation because operators would be required to mitigate impacts until there is a net conservation gain. Mitigation may be conducted off-site if it would provide greater benefit to GRSG as a whole in the planning area, thus potentially resulting in unmitigated impacts on local populations in GHMA.

In CO, ID, ND, NV/CA, OR, UT, WY, and parts of MT/DK (Billings, HiLine, Miles City, ND, SD), priority would be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA, or within the least impactful areas within PHMA and GHMA if avoidance is not possible. Leasing outside of HMAs would reduce potential for impacts associated with horizontal drilling (in PHMA which would be NSO) and with fluid mineral leasing, exploration, and development in GHMA. The prioritization objective could potentially result in temporarily deferring a parcel in PHMA from leasing to a later sale. There would be no similar objective in the Lewistown or Butte Field Offices, and therefore, potential for impacts would be greater.

For both saleable mineral and nonenergy mineral development, WY PHMA would be subject to seasonal restrictions, while WY and MT PHMA would be subject to density and disturbance limits. These additional restrictions would reduce potential impacts to GRSG associated with saleable mineral development, but to a lesser extent than if they were completely closed to development. In Idaho, IHMA would be open to nonenergy mineral development in Known Phosphate Lease Areas, and similar impacts (e.g., displacement and habitat impacts from loss, disturbance, and erosion could occur from open pit mining) could occur in areas open to development.

PHMA in CO, MT/DK, UT, and WY would be considered "essential habitat" for coal unsuitability evaluation. This would likely lead to PHMA in these states being considered unsuitable for coal development and would limit the potential for impacts associated with coal development. ID, NV/CA, and OR would not address coal development due to absence of the mineral.

The oil and gas lease stipulations summarized in **Appendix 2** would be applied in MT/DK; these stipulations would reduce the potential for impacts associated with fluid mineral leasing.

In CO PHMA and within 4 miles of an active lek, siting criteria would be applied to guide development of the lease or unit that would result in the fewest impacts possible to GRSG. Criteria include consideration of location of proposed lease activities in relation to critical GRSG habitat areas, and evaluation of the potential threats from proposed lease activities, and an evaluation of the proposed lease activities, including design features, in relation to the site-specific terrain and habitat features. To authorize an activity based on these criteria, the environmental record of review must show no significant direct disturbance, displacement, or mortality of GRSG.

Lands and Realty Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA in all states, ID IHMAs, and some MT RHMAs would be identified as ROW avoidance areas to allow for management flexibility (except for minor ROWs in WY, as described under state analysis). PHMA would be exclusion areas for wind and solar (utility scale solar only in ID, NV/CA and OR) development (with exceptions in WY, OR, and ID IHMA, see state-specific analysis). Classifying PHMA as exclusion or avoidance areas would decrease the potential for impacts associated with ROW development, such as disturbance and increased potential for predation GHMA in all states would be open to minor ROWs with mitigation measures (WY does not require mitigation, see state-specific analysis).

Impacts associated with ROW development, such as disturbance and increased potential for predation, could occur in these areas if developed, but mitigation measures would help to offset the impacts.

New ROWs in PHMA would not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in Alternative 1. The BLM would collocate new ROWs with existing infrastructure when possible. Alternative 1 would apply at implementation a protective buffer from disturbance around leks in PHMA, IHMA and GHMA, depending on the type of disturbance and based on the latest science. BLM would retain management flexibility to route ROWs to minimize overall impacts on GRSG habitat. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50% greater than the original footprint. These measures would protect GRSG and their habitats from fragmentation, disturbance and predation, and other impacts.

State-Specific Environmental Consequences

In IHMA new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. PHMA in WY would be open to minor ROWs with buffers and mitigation. Effects from ROWs could occur; buffers and mitigation would help offset the impacts, but to a lesser extent than ROW exclusion/avoidance. GHMA in WY would be open to minor ROWs and no mitigation measures would be required. There would be a greater potential for impacts associated with ROWs in these areas.

CO, NV/CA, and OR GHMA would be identified as avoidance areas for major ROWs, which would reduce impacts. ID and UT GHMA would be open to major ROWs with minimization measures, while WY GHMA would be open to major ROWs. In ID and UT, minimization measures would help reduce the impacts, but to a lesser extent than ROW exclusion/avoidance.

Classifying GHMA in CO, NV/CA, and OR as avoidance areas for major ROWs would decrease the potential for impacts associated with ROW development. Opening UT and ID GHMA to major ROWs with minimization measures, would increase the potential for impacts, such as disturbance and increased potential for predation, but mitigation measures would help to offset the impacts. Opening GHMA in WY to major ROWs would also increase the potential for impacts, and there would be no mitigation measures to offset the impacts.

Renewable Energy Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA in all states would be exclusion areas for wind and solar (utility scale solar only in ID, NV/CA and OR) development (with exceptions in WY, OR, and ID IHMAs; see state-specific analysis). Within the exclusion areas, this would eliminate direct impacts from potential renewable energy development on GRSG in PHMA. As a result, GRSG would experience reduced potential for disturbance, habitat alterations, and habitat fragmentation.

State-Specific Environmental Consequences

In WY, PHMA would be avoidance areas for wind development or open if it can be sufficiently demonstrated that development would not result in population declines. ID IHMAs would be avoidance areas for utility-scale solar and wind development. PHMA in OR would be avoidance areas for wind and solar development in Lake, Harney, and Malheur Counties. Classifying PHMA as avoidance areas would decrease the potential for impacts, but to a lesser extent than exclusion areas.

Classifying GHMA in CO, MT/DK, NV/CA, and OR as avoidance areas for wind development, GHMA in CO, MT/DK and OR as avoidance areas for solar development, and GHMA in NV/CA and UT as exclusion

areas for solar development, would decrease the potential for impacts associated with wind and/or solar development. GHMA in ID, UT and WY would be open to wind development and GHMA in ID and WY are open to solar development, so there would be a greater potential for impacts *s*.

Depending upon the potential for renewable energy development and the size and location of permitted development in GRSG habitat, there could be impacts ranging from discountable in less important habitats to decreasing the population growth rate if placed in important habitats. COAs could be applied to reduce impacts on GRSG, but they would not be consistently applied across the decision area. Renewable energy development in GRSG habitat would be expected to result in habitat loss, degradation, fragmentation, and direct disturbance to the birds. Based on previous research (e.g., LeBeau 2012), nests and broods near wind facilities would have a lower rate of success and such declines in these vital rates, especially impacts on nest success, would decrease the population growth rate in these populations and may lead to loss of the population over time (Taylor et al. 2012).

Livestock Grazing Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA and GHMA in all states, and ID IHMA, and would be available for domestic livestock grazing. Impacts to GRSG and habitat from grazing, such as habitat alterations, could occur in PHMA, GHMA, and ID IHMAs.

Priority for review and processing of grazing permits/leases would be in SFAs, followed by PHMA outside of SFAs. Precedence would be given to existing permits/leases in these areas not meeting land health standards, with focus on those containing riparian areas, including wet meadows. Prioritization would help LM identify issues that may be associated with improper grazing and implement corrective actions in the areas that have the greatest habitat value. Management changes, if required, would be tailored to meet land health standards and GRSG habitat objectives. BLM would also require thresholds and responses to address and respond to future conditions in new fully processed permits. The review process described above would reduce impacts to GRSG from grazing if review leads to adjustments to existing permits/leases that improve land health standards.

State-Specific Environmental Consequences

In MT/DK, BLM would use applicable RDFs to mitigate potential impacts from West Nile virus when developing or modifying water developments. This would reduce potential for impacts to GRSG from disease spread associated with livestock subsidies.

Under Alternative 1 all or portions of 13 key RNAs in Oregon would be unavailable for livestock grazing (see **Appendix 17** for further analysis). In key RNAs, 21,959 acres would be unavailable to livestock grazing (**Table 3-25**, Oregon Key RNA Acreages). Two key RNAs (Foster Flat and Guano Creek-Sink Lakes) would remain unavailable to livestock grazing. **Tables 4-2** and **4-3** provide corrections and updates to the vegetation communities with the various key RNAs and are based on new, site-specific information gathered or generated by the Lakeview, Vale, and Burns districts in Oregon. Under Alternative 1, fencing would be present in and adjacent to key RNAs in Oregon. The ability to distribute livestock would generally be maintained, and impacts would be limited from these actions (BLM 2015a, p. 4-203). Making portions of RNAs that contain plant communities important to GRSG unavailable to grazing could provide the BLM with areas for baseline vegetation monitoring without the influence of BLM-permitted activities. Whether removal of grazing would reduce the risk of invasive plant spread into the key RNAs is uncertain.

Wild Horse and Burro Management

Rangewide Environmental Consequences

Under Alternative 1, wild horse and burro populations would continue to be managed for AMLs and in balance with other resource uses. Wild horse and burro gathers would be prioritized based on escalating or potential emergencies, public safety, nuisance animals, court orders, population growth suppression, and resource impacts associated with monitoring data, which is generally based on wild horse and burro population inventories, wild horse and burro condition, availability of sufficient water and forage resources, rangeland health, use levels of upland habitats, and riparian resource conditions. Evaluation of land health assessments in wild horse and burro HMAs could identify vegetation conditions that could prompt gathers, reducing wild horse numbers and the associated impacts on GRSG habitats.

Predation Management

Rangewide Environmental Consequences

Under Alternative 1, following more specific vegetation objectives and reducing opportunities for predators may, in some cases, improve the quality of habitat and decrease opportunities for predation. Improved habitat conditions and decreases in predation would increase nest success, chick survival, and GRSG persistence over the long term.

State-Specific Environmental Consequences

In NV/CA, UT, and WY, habitat objectives to minimize human resource subsidies, and coordinate with other partners on predator management would likely reduce exposure of predatory birds to GRSG nests and chicks, thereby ensuring GRSG persistence until habitat conditions improve (O'Neil et al 2018). Similarly, habitat management in CO, NV/CA, and UT to provide GRSG concealment from predators may help reduce predation and increase GRSG persistence.

ACEC Designation

Alternative 1 would not result in any impacts from ACEC designation since it does not include designation or management for ACECs.

10.2.3 Alternative 2

Habitat Designation and Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as SFAs, PHMA, IHMAs, and GHMA and associated management would be similar to those described for Alternative 1 (**Table 2-3**). The overall acreage would be slightly less with less than 1% fewer acres of PHMA and approximately 1.5% fewer acres of GHMA. Some SFAs would be removed in states as described under state impacts. Impacts from language to maintain and enhance sagebrush habitats would be the same as described for Alternative 1. Additionally, habitat objectives would be the same as described for Alternative 1.

State-Specific Environmental Consequences

Removing SFAs in CA, ID, NV, UT, and WY would reduce protections to GRSG and habitat. However, previous management area classifications (e.g., PHMA, GHMA) would remain, but protections may be lower under some of those other classifications. Reducing restrictions to land use and surface-disturbing activities could increase the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. Habitats in these areas would likely be reduced in quality due to impacts associated with mineral development. If protections are lacking from adjacent lands and the lands are developed, this could lead to habitat fragmentation due to large, contiguous areas of habitat losing habitat suitability. Protections to GRSG and

habitat from restrictions to land use and surface-disturbing activities would continue in SFAs in MT and OR, and impacts would be as described under Alternative 1. Management of RHMA would be the same as described for Alternative 1.

Under Alternative 2, the GHMA designation in UT would be removed with all its corresponding management actions from the 2015 plan amendments. Removal of GHMA and their associated management actions would likely incentivize development in areas formally identified as GHMA and could therefore lead to GRSG habitat loss and alterations.

Requirements for mitigation that achieves a net conservation gain in all HMA types would apply in MT/DK, NV/CA, and OR, and impacts would be the same as described for Alternative 1. CO and ID would enforce mitigation resulting in no net loss in HMAs. This would help offset impacts associated with land use activities, but to a lesser extent than Alternative 1, in which a net conservation gain would be required. In UT and WY, the net conservation gain requirement would be removed. Although the BLM would not require compensatory mitigation in HMAs, it would enforce state mitigation policies and programs. In CO, ID, NV/CA, OR, UT, and WY HMAs, compensatory mitigation would be voluntary unless required by laws or by the State. As a result, the potential for impacts from land use activities would be greater relative to Alternative 1.

Impacts from applying a 3% (CO, ID, NV/CA, OR, UT, and the Dakotas) or 5% (MT, WY, and the Dakotas) disturbance cap in PHMA would be similar to those described for Alternative 1. In UT and ID the cap could be exceeded if it would benefit GRSG. The cap would be applied at the BSU and project scale, except in ID which would only apply it at the BSU scale. Consequently, some additional development could occur in ID, which may increase potential for habitat loss and alterations, particularly for individual leks and their surrounding habitat.

The ability to exceed the disturbance and density caps could result in loss and degradation of GRSG habitat and impacts on local GRSG populations. Exceedances to the caps would only be allowed if site-level analysis indicates that the project, in combination with all voluntary and required design features, will improve the condition of GRSG habitat. The risk in allowing this exceedance is the possible loss of a specific type of habitat that mitigation may not address because it does not require compensation for the exact same habitat value. Consequently, it is possible that while the required habitat improvement will occur, it may not address the loss of a specific habitat type. This may result in a long-term impact on GRSG in the project area.

Impacts from including an adaptive management strategy would be similar to those described for Alternative 1. Some states would include the addition of "un-triggers", meaning that the management change implemented to reverse a trigger could be revoked and the original management would be reimplemented once the issue is resolved. Reverting back to the original management that resulted in the trigger being tripped could lead to additional population declines and/or habitat degradation that could cause the trigger to be tripped again.

In Idaho, BLM would apply the lek buffer distances for certain land uses from the 2019 Idaho GRSG ARMPA, or Alternative 2, and as described in **Appendix 19**. In general, the buffer distances would vary by HMA type, with buffer distances in PHMA being the largest followed by IHMA, then GHMA. Buffer exception criteria would be included for IHMA/GHMA as described in the appendix. Under Alternative 2, buffer distances in PHMA and IHMA are based upon the 'lower end of the interpreted range' and mostly the 'literature minimum', respectively, as summarized in the USGS Report, *Conservation Buffer Distance Estimates for Greater Sage-Grouse – A Review* (Manier et al. 2014). Buffers would reduce disruption to GRSG, minimize

habitat loss, and reduce habitat degradation, which should result in maintaining nesting habitat effectiveness and brood survival. Protections would be greatest in PHMA, followed by IHMA, then GHMA. This approach would encourage development outside of the best habitat and into lesser quality or non-habitat.

In UT, the GHMA designations would be removed with all its corresponding management actions from the 2015 plan amendments. Alternative 2 prioritizes the importance of management prescriptions on PHMA to protect the seasonal habitats that support over 95% of GRSG populations in Utah. Impacts would likely accelerate the effect on resources in the former GHMA since those acres will be removed from management consideration. GRSG management would revert to the management in place prior to the 2015 ARMPA; therefore, some protections such as lek buffers, seasonal restrictions may still be applied depending on the GRSG resource present.

Minerals Management

Rangewide Environmental Consequences

Impacts from fluid mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in CO PHMA and CO GHMA.

Impacts from saleable mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in ID IHMAs and NV/CA PHMA.

Impacts from nonenergy mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in NV/CA PHMA.

Impacts from coal management in PHMA and GHMA would be the same as described for Alternative 1, except in UT PHMA.

Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) has no impact. The Secretary proposes and makes withdrawals through a separate process pursuant to section 204 of FLPMA not through BLM land use planning.

State-Specific Environmental Consequences

Removing the closure of CO PHMA to fluid mineral development would increase potential for disturbance and habitat alterations/degradation since mineral development activities could occur in previously closed areas and potentially result in impacts described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely have minimal impacts since the stipulation would avoid potential for disturbance and habitat alterations/degradation from surface-disturbing activities.

Impacts from prioritizing fluid mineral leasing outside of HMAs in CO, ID, OR, and MT/DK offices would result in the same impacts in these states as described under Alternative 1. Removing the objective in UT and NV/CA would increase the potential for impacts because land in PHMA and GHMA could be leased. Removal of the fluid mineral leasing prioritization objective would not increase threats, since the NSO stipulation would still be in effect. In WY, fluid mineral leasing would be allowed in PHMA, which would increase the potential for impacts. If BLM has a backlog of Expressions of Interest for leasing, the BLM would prioritize work first in non-habitat followed by lower habitat management areas (e.g., GHMA). For fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts consistent with lessees' rights.

Adding exception criteria to saleable and nonenergy mineral closures for NV/CA PHMA and allowing consideration of new free use permits for saleable minerals in ID IHMA and NV/CA PHMA would increase the potential for associated impacts.

Identifying essential habitat in UT PHMA as part of future coal unsuitability criteria would likely lead to these areas being considered unsuitable for coal development and would limit the potential for associated impacts.

In CO PHMA and within 4 miles of an active lek, impacts from applying siting criteria for fluid mineral development would be the same as those described for Alternative 1.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from ROW management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA, see state-specific analysis).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW development in NV PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from renewable energy management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW and wind/solar development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development.

Livestock Grazing Management

State-Specific Environmental Consequences

Impacts from domestic livestock grazing management would be the same as described for Alternative 1, with the following exceptions. The removal of review prioritization and processing of grazing permits in UT, WY, and NV/CA, may have minimal impacts as BLM still has the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

In Oregon, all or portions of 13 key RNAs would be available to livestock grazing, consistent with all applicable regulations and policies. The 13 key RNAs available for livestock grazing would be Black Canyon, Dry Creek Bench, East Fork Trout Creek, Fish Creek Rim, Foley Lake, Lake Ridge, Mahogany Ridge, North Ridge Bully Creek, Rahilly-Gravelly, South Bull Canyon, South Ridge Bully Creek, Spring Mountain, and Toppin Creek Butte (BLM 2019a, p. 1-6). The key RNAs would be required to meet land health standards and other applicable BLM regulations and policies and would remain subject to management, including regulation of grazing, to maintain and promote the characteristics of the RNAs (BLM 2018, p. 4-6). Grazing impacts would vary within and among the key 13 RNAs, depending on site productivity, timing of grazing, stocking intensity, and duration of grazing (Oregon Greater Sage-Grouse Proposed RMPA/Final EIS 2018, p. 4-6). Alternative 2 would result in 21,959 fewer undisturbed acres within Oregon available for additional

research in plant communities important to GRSG (Oregon Greater Sage-Grouse Proposed RMPA/Final EIS 2018, p. 4-7). The small size of the RNAs likely limit any impacts of livestock grazing on larger GRSG populations. Two key RNAs (Foster Flat and Guano Creek-Sink Lakes) would remain unavailable to livestock grazing.

In MT/DK, impacts from using applicable RDFs to mitigate potential impacts from West Nile virus when developing or modifying water developments would be the same as described for Alternative 1.

Wild Horse and Burro Management

Rangewide Environmental Consequences

Impacts from wild horse and burro management would be the same as described for Alternative 1.

Predation Management

Rangewide Environmental Consequences

Impacts from objectives to reduce opportunities for predators would be the same as described for Alternative 1.

State-Specific Environmental Consequences

Impacts from state-specific predation management objectives in CO, NV/CA, and WY would be the same as described for Alternative 1. Adding specific language to address corvid nests in UT may reduce human subsidies that attract corvids, which would reduce predation levels (Coates et al. 2015; O'Neil et al 2018).

ACEC Designation

Alternative 2 would not result in any impacts from ACEC designation since it does not include designation or management for ACECs.

10.2.4 Alternative 3

Habitat Designation and Management

Rangewide Environmental Consequences

Under Alternative 3, all HMAs would be managed as PHMA, over double the acreage of PHMA compared with Alternatives 1 and 2 (**Table 2-3**). Management actions for PHMA, such as lek buffers, required design features, fluid mineral leasing prioritization, and habitat objectives, would be more restrictive. Managing previously designated GHMA as PHMA would minimize potential impacts to GRSG. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would decrease potential for disturbance to birds and habitat alterations because management restrictions associated with PHMA would occur over a larger area.

There are no SFAs under this alternative, but their absence would likely not reduce protections to GRSG habitat rangewide. Although management actions for PHMA would be less restrictive than those for SFAs, management restrictions in PHMA under this alternative would be more restrictive than Alternatives 1 and 2 and applied to a greater overall area, designed to promote GRSG conservation and reduce potential impacts from land-use activities. Management restrictions would only be applied to development associated with valid existing rights as no new activities would be authorized.

Impacts from mitigation would be similar to Alternative 1 as BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types. Compensatory mitigation would need to fully offset any residual effects on habitat function and value at the scale necessary to meet the RMP GRSG goals and objectives. These requirements reduce the potential for impacts from land use activities such as habitat loss

or alterations. Maintaining habitat function and value would help increase nesting success and brood survival, thereby contributing to the species' persistence.

BLM would apply a 3% cap for pre-existing authorizations or disturbances (including infrastructure, wildfire, and agriculture) at the project scale and within HAF fine scale habitat selection area (for all states except WY, which does not have fine scale HAFs) while honoring valid existing rights. The disturbance cap would not be applicable to new authorizations since all PHMA would be closed to new infrastructure projects. If disturbance from existing infrastructure developments exceeds 3% of habitat at the project scale or HAF fine scale area, new infrastructure associated with pre-existing authorizations would be deferred. The smaller size of most HAF fine-scale areas compared to BSU-scales might result in the cap being reached more quickly. This may prevent some development and associated impacts to GRSG. Fine scale HAFs represent an individual's home range and are determined in part by the quality and juxtaposition of resources within and between seasonal habitats, so reducing disturbance in these areas may help ensure that habitat function and quality remains to support seasonal movements. There would be no disturbance cap exceptions under this alternative, which may result in a lower level of disturbance overall. Including wildfire and agriculture as part of the overall disturbance cap would also result in a lower level of disturbance, particularly since wildfire was the cause of most of the habitat loss between 2012 and 2018 (Herren et al. 2021).

Currently, the percentage of disturbance in PHMA/IHMA within fine scale HAF boundaries is well below 3% and below 1% in most areas (BLM GIS 2023), yet population and habitat trends are still declining (Herren et al. 2021). Implementing a 3% disturbance may result in a continuation of these trends, but to a lesser extent than if the disturbance cap were higher (or non-existent). Habitat connectivity is important to maintaining gene flow and ensuring genetic diversity and distribution (Row et al. 2018), so limiting fragmentation by adhering to disturbance caps would help maintain population connectivity.

BLM would include an adaptive management strategy for habitat loss due to development under this alternative. Management is already restrictive, so additional management would be limited to proactive measures, which are dependent on budget and staffing.

Effects from habitat management and conservation would be similar to those described for Alternative 1. Alternative 3 would include additional objectives to maintain existing connectivity between GRSG populations. This would contribute to GRSG persistence and viability by continuing to facilitate gene flow and allowing for genetic variation (Row et al. 2018). Genetic variation and connectivity are necessary for GRSG resilience as described under the affected environment.

State-Specific Environmental Consequences

In Wyoming, BLM would apply a 3% cap (including infrastructure, wildfire, and agriculture) at the project scale and within neighborhood cluster boundaries. Clusters are used in place of fine scale HAF boundaries as HAF boundaries have not been delineated for Wyoming. Two of the Wyoming clusters (D-151 and D-147) are currently exceeding the 3% disturbance cap, and therefore, no more development could occur in these areas. Disturbance levels on the remaining 110 clusters are below 2% (BLM GIS 2023).

In Montana and the Dakotas, allowing treatments in PHMA to conserve, enhance or restore GRSG habitat and re-establishment of sagebrush cover and desirable understory plants would improve habitat quality and quantity, which would potentially contribute to GRSG persistence and viability. Lek buffers would apply to all surface disturbing activities associated with pre-existing authorizations and disturbances, and would therefore, reduce GRSG habitat loss and lek disturbance.

In NV/CA, lek-buffer protections included in 2015 and 2019 ARMPAs applies to all active or pending active leks regardless of HMA designation (see **Appendix 4** for lek definitions). This change is consistent with FLPMA (43 United States Code (USC) 1701 Sec. 201) and BLM Manual 6840 in that it provides protections for special status species. Impacts to discretionary surface-disturbing activities include an increase in area where GRSG surveys are conducted beyond PHMA and adoption of no surface disturbance buffers within potential project areas. This would benefit GRSG by applying protective buffers to leks which otherwise might not be applied until an updated HMA model is available.

In Idaho, lek buffers would be applied to active and pending active leks according to Idaho's lek definitions (see **Appendix 4** for lek status definitions by state) with distances the same as those described under Alternative 1 (see **Appendix 19**). Lek buffers would apply to all surface disturbing activities. Since all HMA would be treated as PHMA, and PHMA would be closed to new infrastructure projects, buffers may provide limited additional protection for GRSG since PHMA allocations are more restrictive and are larger than areas protected by buffers.

In UT, all habitat would be PHMA, including GHMA from Alternative 1. PHMA would include some areas of unoccupied habitat, historic habitat where birds have not been observed in 20 years or more or may have never occurred (e.g., habitat west of Sanpete Valley), areas of non-habitat (e.g., phase 3 pinyon-juniper, rock outcrops), and areas which are currently not habitat but could become habitat through significant restoration. Including these areas under the more restrictive management of Alternative 3 raises the concern that BLM would not use the least restrictive constraint to meet the resource protection objective in leasing restrictions for existing development rights. Under Alternative 3 in UT, all occupied leks are encompassed by PHMA.

Minerals Management

Closing PHMA to fluid mineral leasing, saleable minerals, and nonenergy minerals would reduce potential impacts to GRSG and habitat, such as disturbance and habitat alterations. Valid existing leases may be developed under this alternative. Impacts would be reduced to a greater extent than Alternatives 1 and 2 since areas closed to leasing could not be developed. Closing PHMA to mineral leasing and development would protect GRSG habitat from surface-disturbing activities and associated habitat fragmentation and maintain connectivity between leks. GRSG would not be exposed to disturbance associated with noise and human activity that accompanies construction, development, or production activities. Restrictions to development on BLM lands might push development onto private land, which could result in indirect impacts.

State-Specific Environmental Consequences

Impacts from managing coal in CO, MT/DK, UT and WY would be same as described for UT in Alternative 2. In UMRBNM in Montana, BLM land will not be disposed of other than by exchange, and only when necessary to further the protective purposes of the Monument. Protecting this area would also reduce impacts to GRSG and habitat by reducing surface disturbances associated with mineral resource management. In CO PHMA and within 4 miles of an active lek, impacts from applying siting criteria for fluid mineral development would be the same as those described for Alternative 1.

Lands and Realty Management

All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. This would decrease the potential for impacts associated with ROW development. The inability to site ROWs in PHMA could lead to longer ROW routes in order to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on GRSG

habitats outside of PHMA and may result in increased impacts on GRSG populations using habitat on adjacent state, tribal, or private lands.

Renewable Energy Management

PHMA in all states would be ROW exclusion areas for wind and solar energy development. Prohibiting wind energy development would eliminate the likelihood for habitat loss, degradation, fragmentation, and direct disturbance to birds in these areas. Alternative 3 would offer more protection from renewable energy development than under Alternatives 1 and 2 because more areas would be excluded from renewable energy development with no exceptions.

Livestock Grazing Management

Rangewide Environmental Consequences

All PHMA would be unavailable for domestic livestock grazing. Livestock would be removed from PHMA and impacts to GRSG and habitat associated with grazing, such as habitat alterations would be reduced. Removing livestock could lead to increases in herbaceous understories, which would increase forage availability and nesting habitat suitability for GRSG. Changes would depend on factors such as current conditions, climate, other land uses, etc. Removing livestock could also result in changes to the vegetation community composition, which could alter GRSG habitat suitability depending on the change.

Removing livestock from PHMA would reduce the potential for disease transmission assuming removal of man-made water sources to support livestock, such as water troughs, which may house vectors for diseases, such as West Nile virus (Naugle et al. 2004). Avian predators may be reduced if range improvements, including artificial water sources and fences, are also removed (Stevens et al. 2012; Manier et al. 2013, Coates et al. 2016). If livestock are removed on BLM, fences may be erected to fence out BLM lands from adjacent private grazing lands. If fencing increases in areas of mixed ownership, there would be increased potential for impacts such as injury or mortality from fence strikes and predation. removing livestock from BLM lands may also concentrate grazing on private lands, potentially leading to overgrazing and decreased GRSG habitat suitability where concentrated grazing occurs. There would be the possibility of increased wildfires without livestock to reduce fine fuels on a large portion of the landscape (see **Section 4.4**). If the potential for a large-scale wildfire were to increase, this could put large areas of GRSG habitat at risk of damage or loss.

State-Specific Environmental Consequences

In MT/DK, CHMA would be available for grazing. Impacts would occur in CHMA BLM would assess and modify as needed water features to reduce the risk of potential impacts from West Nile Virus or other disease outbreaks.

Impacts in key RNAs in Oregon would be the same as described for Alternative 1.

Wild Horse and Burro Management

Removing wild horses and burros in PHMA would increase total vegetation, grass abundance and cover, sagebrush canopy cover, species richness, and dominance of palatable forbs (Chambers et al. 2017). This would increase habitat quality for wildlife, including GRSG. Where range improvements, such as fences and water troughs are removed, it would decrease potential perch sites for avian predators and potential drowning hazards and/or potential for disease transmission. Gathers needed to remove wild horses and burros from herd management areas could disturb GRSG in the short term through human presence and noise. Additional fencing may be needed to keep wild horses off BLM-administered PHMA.

Predation Management

Under Alternative 3, the risk of predation may be reduced by reducing habitat disturbance, anthropogenic subsidies, and stopping or slowing the incursion of novel predators. Reduced predator numbers would help reduce predation levels and may increase GRSG persistence to a greater extent than Alternatives 1 and 2.

ACEC Designation

Under Alternative 3, all ACECs would be managed as PHMA. The management in ACECs under this alternative would be similar to management in PHMA, with the exception of ROW management and locatable minerals requirements. Managing ACECs as exclusion to ROWs both within and outside of designated corridors would expand protections to GRSG from ROW development compared to PHMA. Plans of operations for locatable mineral disturbances would reduce effects if measures were included to reduce disturbance to GRSG and habitat alterations.

10.2.5 Alternative 4

Habitat Designation and Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as HMAs would be similar to those described for Alternative 1, although PHMA would increase by approximately 10% and GHMA would decrease by 1-2% (**Table 2-3**). Impacts from applying a 3% disturbance cap at the project scale and within HAF fine scale habitat selection area would be similar as to those described for Alternative 3, however, the cap would apply to both existing and proposed infrastructure authorizations (subject to valid existing rights). Wildfire and agriculture would not be included in the disturbance calculation, possibly resulting in more room for new authorizations and infrastructure projects. Since wildfire was the cause of the majority of habitat loss between 2012 and 2018 (Herren et al. 2021), the 3% cap would limit additional disturbance above habitat loss from wildfire.

Exceptions to the disturbance cap could allow for habitat fragmentation and an increased GRSG behavioral responses to the additional development. Habitat avoidance, changes in habitat use, and increased mortality risk from increased predators associated with developed areas, may have compounding adverse effects on GRSG populations. The exception would only be approved if site-specific NEPA analysis indicates that doing so will improve the condition of GRSG habitat in comparison to siting a project outside the designated corridor, so these effects are not anticipated. There would be no exceptions to the 3% PHMA (and IHMA) disturbance cap at the HAF fine scale habitat selection area, which would limit the overall level of disturbance at this scale.

BLM would include population-level adaptive management informed by the results of state wildlife management agency analysis and TAWS, a framework developed to inform anomalies in population trends (Coates et al. 2021). If one of these thresholds is tripped, it would allow management changes in response to population declines. Adaptive management could help slow or reverse negative trends that may reduce GRSG population persistence and viability. If more than 3% of GRSG habitat within a HAF fine scale habitat area is lost from non-anthropogenic (non-development) disturbances, a soft threshold would be met and future new infrastructure projects or permits would be deferred within these areas until habitat services (as indicated by sagebrush recovery) are restored. Inclusion of these non-anthropogenic losses will lessen future habitat declines from anthropogenic disturbances.

State-Specific Environmental Consequences

In Colorado, BLM would clarify the activity period for the leks being included in management allocations and decisions, increasing the amount of BLM-administered lands within buffer distances, and therefore, lands that

would be subject to more intensive management decisions for lek and habitat protection. Alternative 4 would also increase the acreage of GHMA in Colorado where NSO stipulations would be applied compared to Alternatives 1 and 2. The same acreage under major stipulation (NSO) in Alternative 4 would be under moderate stipulation (CSU). This would increase the area of GRSG habitat protected from surface disturbance.

CHMA in Montana and the Dakotas (**Table 2-31**) are areas of connectivity important to facilitate the movement of GRSG and maintain ecological processes, including between priority populations, adjacent states, and across international borders. Management in CHMA that leads to restrictions to land use and surface-disturbing activities would reduce the likelihood for habitat loss, fragmentation, and direct disturbance to GRSG. The restoration focus in RHMA would further improve GRSG habitat. Including more protective management in GHMA (such as ROW avoidance and utility scale solar and wind exclusion or avoidance in some areas) would make management more consistent with the state plan and reduce potential for GRSG impacts such as habitat alterations and disturbance.

In Idaho, lek buffer distances would be the same as under Alternative 1, but buffers would apply to 'active' and 'pending active' leks using the Idaho lek definitions (Cook et al. 2022; see **Appendix 4** for lek status definitions). Lek buffers would apply to a total of 1,254 leks (1,093 active; 161 pending active), where 76% of these leks are in PHMA, 19% of leks in IHMA and 4% of leks in GHMA. This change from Alternative 1 could increase the amount of BLM lands where lek buffers may apply but would depend on HMA type and buffer distance. For the largest buffer distance (3.1 miles), this could result in an increase of 14% of HMA with more restricted BLM management. Effects of this increase in acres of BLM lands where lek buffers may apply would be realized where allocations for resources are open or avoided in HMA, but not for those resources with closed or exclusion allocations in PHMA, such as wind or solar energy development, or nonenergy leasables or saleable minerals (**Table 2-4**).

In NV/CA, impacts from clarifying use of lek-buffer protections included in 2015 and 2019 ARMPAs applies to all active or pending active leks (see **Appendix 4**) regardless of HMA designation would be the same as described for Alternative 3. Of the 380 known occupied leks in Utah, 366 (96.3%) are in PHMA under Alternative 4. As a result, there would be no substantial effect of impacts on small populations in former GHMA.

Minerals Management

Rangewide Environmental Consequences

Leasing would be permitted in HMAs, which would increase the HMA acres affected and potential for impacts in most states. However, BLM would include management actions to minimize potential for conflict and associated impacts from subsequent development. BLM would also prioritize projects that avoid, minimize, reduce, rectify, and/or adequately mitigate direct and indirect impacts to PHMA/IHMAs, and include applicable and technical COAs. The 3% disturbance cap would apply at the fine scale HAF habitat selection area within PHMA/IHMA, which would help reduce overall disturbance and habitat impacts, including fragmentation. Applying an NSO stipulation within PHMA (except WY, see below), IHMA, and some RHMA would also decrease the potential for disturbance and habitat loss, alterations, and fragmentation. Reduced habitat fragmentation would help maintain habitat connectivity and population persistence and viability.

State-Specific Environmental Consequences

Expansion of the NSO stipulation to all PHMA in WY in an area that is already developed will only achieve the protections for new activities. Leks in PHMA would still be impacted by ongoing existing disturbances due to human presence. Greater protections would result where the NSO applies to leks not experiencing as much existing disturbance.

The oil and gas lease stipulations summarized in **Appendix 2** would be applied in MT/DK, limiting the potential for impacts associated with fluid mineral leasing. In all MT/DK HMAs management to refine, streamline, and make stipulations consistent would be applied. A CSU stipulation would be applied to all GHMA rather than just to a lek buffer. This would improve consistency among BLM offices and partner natural resource entities and provide clear and consistent direction to applicants and partners for cross-office boundary projects. Applying stipulations would reduce impacts to GRSG and habitat from fluid mineral resource management. Impacts from closing UMRBNM to mineral leasing and development would be the same as those described for Alternative 3.

In CO PHMA and GHMA, siting criteria would be applied to guide development of the lease or unit that would result in the fewest impacts to GRSG. The following criteria would apply: location of the proposed authorization was determined to be nonhabitat; topography/areas of non-habitat create an effective barrier to impacts; co-locating the proposed authorization with existing disturbance; and/or the proposed location would be an alternative to a similar action occurring on a nearby parcel. Applying these criteria would reduce the potential for impacts to GRSG. If the criteria do not apply but it can be demonstrated that the direct and indirect impacts of the proposed activity would be offset through compensatory mitigation, the authorized officer may consider permitting the action. Construction, drilling, and completion in CO PHMA or GHMA within 4 miles of an occupied lek during lekking, nesting, and early brood-rearing (March 1 to July 15) would be prohibited, but the TL may be adjusted based on application of the criteria described above.

In NV/CA PHMA, GHMA, and OHMA, management direction identifies six criteria used to grant exceptions to the allocation decisions (**Table 2-3**). The criteria narrow the use of mitigation to gain an exception to the allocation decisions. The changes are a benefit to GRSG by reducing consideration of surface disturbing projects that could remove GRSG habitat and/or disturb individuals, and a cost to proponent driven projects in that there would be fewer opportunities to gain exceptions.

All ID PHMA will be closed to new mineral materials development but continued use of existing pits would be allowed. New free use permits and expansion of existing pits may be allowed in certain circumstances and an exception would be possible for new free use permits in areas with existing anthropogenic disturbance. Impacts to GRSG would continue since the disturbance is already existing.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states, ID IHMA, MT CHMA, and some MT RHMA as ROW avoidance areas would be similar to those described for Alternative 1. Where development cannot be avoided, breeding and nesting habitats, or in limiting/high value seasonal habitats would be avoided unless certain criteria are met. This would reduce the potential for impacts by precluding alteration to high value and seasonal habitats and disturbance to GRSG during important life history stages. Where major ROWs cannot be avoided, applying minimization measures (disturbance cap, seasonal constraints, tall structure limitations, RDFs, nest and perch deterrents, etc.) would also minimize potential for impacts. Residual direct and indirect

impacts would be offset through compensatory mitigation. The magnitude of impacts would not be expected to be of a level that would impact GRSG population and lek persistence or viability.

Managing GHMA as ROW avoidance areas within breeding, nesting habitats and other limited seasonal habitats would reduce the potential for impacts particularly by avoiding alteration to high value and seasonal habitats and disturbance to GRSG during important life history stages (breeding, migration). The potential for GRSG to be affected may vary in GHMA depending on the location and ability to relocate the ROW. Some areas, such as plains and prairies, may be more suitable for ROW development, whereas in may be less likely for ROWs to be sited in areas with mountainous or rugged topography.

Avoiding placement of ROWs within one-half mile of PHMA or IHMA would protect those areas from indirect impacts. Because all other areas would be managed as ROW open, impacts, such as habitat alteration and disturbance, could occur, however, compensation would be required.

State-Specific Environmental Consequences

Effects from applying an NSO stipulation within 0.6 miles of leks in PHMA in WY would have effects as described for Alternative 1.

In Colorado, a timing limitation would be expanded to include GHMA and added to leased areas as conditions of approval of the ROW; this would reduce impacts to GRSG and habitat.

In Idaho, lek buffers would be the same as under Alternative (**Appendix 19**). Lek buffers would protect leks from new disturbance and together with other restrictions in HMA, such as RDFs, Mitigation, Disturbance Cap, would serve to ensure responsible development.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states and some MT RHMA as ROW exclusion areas for wind and solar energy development would be similar to those described for Alternative 3 (excludes IHMAs). Since PHMA would apply to a smaller area under this alternative, the extent of protection from disturbance associated with from renewable energy development would be less.

Managing GHMA as avoidance areas for wind and solar energy development in all states would decrease the potential for impacts associated with wind and/or solar development. Where avoidance is not possible, impacts to GRSG habitat would be minimized through measures such as avoiding surface use, occupancy, or placement of utility scale wind and solar facilities within one-half mile of PHMA, within one mile of active leks, and outside limited/high value seasonal habitats and movement corridors. Such measures would protect PHMA from indirect impacts; reduce potential for habitat alterations in breeding areas, migration corridors, and high value habitat; and minimize disturbance to breeding and migrating birds. Managing GHMA and MT CHMA as avoidance areas for wind and solar energy development would limit opportunities for development but reduce potential for GRSG disturbance and habitat alterations and fragmentation, in GHMA that are adjacent to PHMA.

State-Specific Environmental Consequences

Managing ID IHMAs as exclusion areas for wind and solar energy development within 3.1 miles from active leks and avoidance in the remainder of the IHMA would decrease the potential for impacts but to a lesser extent than if the entire IHMA were managed as an exclusion areas as there would be greater potential for development to occur outside of 3.1 miles from leks. Development outside of this buffer would likely not

disturb leks or alter lekking or nesting habitat. Infrastructure would be considered only if it would not impair habitat use by GRSG and will meet RMP GRSG goals and habitat objectives, so any alternations or disturbance would not impact lek or population persistence/ viability.

Surface use, occupancy, or placement of utility scale wind and solar facilities would be prohibited within one-half mile of PHMA, so adjacent PHMA would be protected from indirect impacts from development in IHMAs. This would limit opportunities for development but reduce potential for disturbance and habitat alterations adjacent to PHMA.

Livestock Grazing Management

Rangewide Environmental Consequences

The presence of GRSG HMAs would not affect whether an area is available for livestock grazing or change existing status of lands available or unavailable for livestock grazing, so impacts from domestic livestock grazing management would be similar to those described for Alternative 1. BLM would alter management objectives and actions to minimize, reduce, or correct for any impacts to GRSG and habitat, managing livestock grazing to meet or make progress toward meeting the GRSG habitat objectives. Adjustments to existing AUMs would be made based on site-specific conditions providing flexibility to adjust permits conditions to avoid or reduce impacts to GRSG or habitat. If land health assessment conditions are not met as indicated by an assessment specific to site capability, adjustments to grazing practices would be made to provide for suitable GRSG habitat at the HAF site scale. Range management improvements and existing infrastructure would be evaluated with respect to their effect on GRSG and GRSG habitat. This could help prevent impacts associated with grazing infrastructure such as increased predation and disease transmission (Coates et al. 2016). These management actions and objectives would help to minimize, reduce, or correct for GRSG disturbances and habitat alternations that could otherwise lead to impacts on population persistence and viability.

State-Specific Environmental Consequences

Impacts from permitting grazing in CHMA and from reducing the risk of potential impacts from West Nile Virus would be the same as described for Alternative 3. Impacts in key RNAs in Oregon would be the same as described for Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 4 would be the same as described for Alternative 1.

Predation Management

Impacts from reducing opportunities for predators would be similar to those described for Alternative 1 with the exception that precluding new anthropogenic infrastructure new anthropogenic infrastructure would be avoided where possible. There would be a slightly greater potential for new infrastructure to occur, which could attract predators and increase predation on GRSG. Other measures to maintain predation at natural levels would be applied, so this is not expected to increase predation to a level that would influence lek or population persistence and viability.

ACEC Designation

Alternative 4 would not result in any impacts from ACEC designation since it does not include management for ACECs.

10.2.6 Alternatives 5 and 6

Habitat Designation and Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as HMAs would be similar to those described for Alternative 1, though the BLM would manage approximately 7% more PHMA than Alternatives 1 and 2 and 10% fewer acres of GHMA (**Table 2-3**). Impacts from applying a 3% cap would be the same as described for Alternative 4, except in WY and MT (see State-Specific Environmental Consequences). Impacts from exceeding the 3% disturbance cap would be similar to those described for Alternative 4, but more exceptions would be allowed, which may result in increased development and disturbance to GRSG and habitat. Allowing a project to proceed before compensatory mitigation is in place would result in a time lag, during which GRSG habitat would be fragmented and reduced in carrying capacity by project impacts, so habitat and population trends may continue to decline to a greater extent compared to Alternative 4. Impacts from population and habitat adaptive management would be the same as described for Alternative 4.

State-Specific Environmental Consequences

Impacts from applying a 5% disturbance cap at the project scale in WY and MT would be similar to those described for Alternative 1. The 3% disturbance cap would still apply at the HAF fine scale habitat selection area, which may limit additional development reducing fragmentation of GRSG seasonal habitats and ensuring habitat function and quality remain to support seasonal movements. WY and MT would include wildfire and agriculture in the disturbance calculation, so the level of disturbance from other sources (energy development, roads, RPWs, etc.) would be relatively lower.

In Colorado, impacts from applying a 1-mile lek buffer as the minimum threshold would be the same as described for Alternative 1. These alternatives would allow for more flexibility in development while maintaining the BLM's ability to apply site-specific criteria for GRSG habitat protection. Alternative 6 also includes potential CSU stipulations to be applied in GHMA within 1 mile of PHMA. This would allow for increased flexibility while considering indirect effects that development in GHMA may have on PHMA.

Management in Wyoming SHMA would be consistent with GHMA restrictions, which would increase protections to GRSG and habitat.

Impacts from designating RHMA and CHMA in Montana and the Dakotas would be the same as described for Alternative 4. Including more protective management in GHMA (ROW avoidance within 1.2 miles of active leks and crucial winter range, and utility scale solar and wind exclusion or avoidance in some areas) would make management more consistent with the state plan and decrease potential for impacts such as habitat alterations and disturbance.

In Idaho, lek buffers would be similar as those under Alternative 2 and consistent with the 2021 Idaho Sage-grouse Plan (State of Idaho 2021). Buffers would apply to active and pending active leks (Cook et al. 2022; **Appendix 4**) resulting in a potential increase in the amount of BLM lands where lek buffers, similar to Alternative 4. Lek buffers would remain the same in PHMA, except for minor linear features where less PHMA would be protected (**Appendix 19**).

Compared to Alternative 2, buffer distances would increase in IHMA for major linear features and transmission line towers, resulting in more IHMA potentially protected from these disturbances (**Appendix 19**). Buffer distances would be decreased in IHMA for communication and meteorological towers in IHMA, and in GHMA for surface disturbances due to continuing human activities that alter or remove the natural

vegetation. These decreases in buffer distances would result in less IHMA and GHMA protected from these types of disturbances.

Compared to Alternatives 1, 3, and 4, Alternatives 5 and 6 would have reduced buffers in IHMA and GHMA (**Appendix 19**). Alternatives 5 and 6 would have buffer exception criteria, where BLM may approve actions within IHMA and GHMA if it is impracticable to locate the project outside of the buffer and impacts are avoided through project siting and design, to the extent reasonable. The reduced buffer distances in IHMA and GHMA would reduce restrictions while maintaining buffers for PHMA, and are in line with Idaho's three-tiered habitat approach. Since development and anthropogenic disturbance could occur closer to leks in IHMA and GHMA, some leks would be at higher risk of effects from development, such as avoidance behavior, reduced productivity, or decline in lek abundance. A more detailed analysis would occur during project-specific NEPA analysis.

In NV/CA, impacts from clarifying use of lek-buffer protections included in 2015 and 2019 ARMPAs applies to all active or pending active leks (see **Appendix 4** for lek definitions) regardless of HMA designation would be the same as described for Alternative 3.

In UT, Alternatives 5 and 6 would prioritize habitat management areas (PHMA and GHMA) that encompass 95.6% of the male GRSG counted on leks during 2023 surveys. This includes 2,740 (93.8%) males counted within PHMA, 54 (1.8%) counted in GHMA and 127 (4.3%) counted outside of any HMA. GHMA designations in Morgan-Summit, South Slope Uintah/Blue Bench, and Uintah Population Area (Deadman's Bench, East Bench, and Book Cliffs) would be removed, including any corresponding management actions. 90% of Utah's GRSG are supported by habitat in PHMA under these alternatives so there would be no substantial effect of accelerating impacts on the small populations in former GHMA.

Minerals Management

Rangewide Environmental Consequences

Impacts from mineral resource management would be similar as described for Alternative 4 with state-specific differences described below.

State-Specific Environmental Consequences

The oil and gas lease stipulations summarized in **Appendix 2** would be applied in MT/DK, limiting the potential for impacts associated with fluid mineral leasing. Applying a 5% disturbance cap at the project scale in MT and WY, and 3% disturbance cap at the HAF fine scale area could allow for more potential mineral development, which could increase disturbance and habitat alterations, including fragmentation (see **Table 2-3**). Allocations in PHMA in WY differ between Alternative 4 and Alternative 5.

Impacts from consistency in stipulations in MT/DK HMAs and from closing UMRBNM to mineral leasing and development would be similar to those described for Alternative 3.

Impacts from applying siting criteria for development in CO PHMA and GHMA would be similar to those described under Alternative 4. To grant an activity based on compensatory mitigation, the compensation project must be planned, funded, and approved in coordination with the State of Colorado.

In NV/CA, impacts from identifying criteria for granting exceptions to allocation decisions would be the same as described for Alternative 4.

Impacts from closing ID PHMA to new mineral materials development but allowing continued use of existing pits would be the same as described for Alternative 4. Impacts from reduced lek buffers in IHMA and GHMA

would provide for additional opportunities for mineral resource management, specifically saleable minerals and nonenergy leasables.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states, ID IHMA, MT CHMA and some MT RHMA as ROW avoidance areas and applying minimization measures where major ROWs cannot be avoided would be similar to those described for Alternative 4. Micro-siting to avoid placement near leks or in connectivity corridors to avoid dividing breeding habitat from adjacent nesting or other seasonal habitats would reduce potential for alteration to high value and seasonal habitats and disturbance to GRSG during important life history stages (e.g., breeding, migration). Major ROWs that are located inside RMP designated ROW corridors would not need to comply with disturbance cap or compensatory mitigation requirements, so habitat alteration and disturbance could occur where these corridors overlap PHMA.

Managing GHMA in all states and WY SHMA as ROW open with minimization measures and compensation, to maintain habitat supporting GRSG populations consistent with state agency habitat designations and to preclude negative impacts to any adjacent PHMA habitats would reduce the potential for impacts. Reduction of impacts would be to a lesser extent than if managed as avoidance areas.

State-Specific Environmental Consequences

In Colorado, impacts from expanding a timing limitation to include GHMA for conditions of approval of the ROW would be the same as described for Alternative 4.

In Idaho, lek buffers would be similar as those under Alternative 2 and consistent with the 2021 Idaho Sage-grouse Plan (State of Idaho 2021). Lek buffers would be reduced in IHMA and further reduced in GHMA. Effects would be similar to those described under Minerals Resource Management under Alternatives 5 and 6. These effects would be analyzed in detail during the project-level NEPA analysis.

Renewable Energy Management

Rangewide Environmental Consequences

Classifying PHMA and IHMA as avoidance areas for wind and solar energy development but exclusion in breeding/nesting habitat and limited seasonal habitat would decrease the potential for impacts but to a lesser extent than if all HMA were exclusion areas. Solar and wind development would be considered on a case-by-case basis in avoidance areas. Development would not be allowed in breeding and nesting habitats, or in limited/high value seasonal habitats unless certain criteria are met (refer to **Table 2-10**), so the magnitude of impacts, such as disturbance and habitat alterations, would not be expected to be of a level that would influence lek or population persistence/ viability.

Managing GHMA and WY SHMA as open to wind and solar energy development would result in potential impacts. The inclusion of minimization measures and compensation to maintain habitat supporting GRSG populations consistent with state agency habitat designations (e.g., restoration, connectivity, seasonal, or other), and to preclude negative impacts to any adjacent PHMA habitats would reduce the potential for those impacts in high value and seasonal habitats.

State-Specific Environmental Consequences

In Idaho, PHMA and IHMA would be avoidance areas for utility scale wind and solar energy development (including met towers). Development would not be allowed in breeding and nesting habitats, or in limited/high value seasonal habitats unless one of the criteria below is met. Development would not be

allowed within breeding and nesting habitat inside lek buffers (**Appendix 3**), but breeding and nesting habitat outside of lek buffers would be avoidance areas.

Differences in effects between Alternatives 4, 5, and 6 are described under Greater Sage-grouse, Habitat Designation and Management and Minerals Resource Management, State-specific Circumstances, Alternatives 5 and 6 above. With the increased interest in renewable energy development including utility scale wind and solar energy development in Idaho, there may be increased impacts to GRSG leks in PHMA, IHMA and GHMA under Alternatives 5 and 6. Reduced lek buffers in IHMA and GHMA and a possible buffer exception could result in possible lek abandonment, avoidance behavior, or reduced productivity due to increased anthropogenic disturbance around a lek. The extent of impacts would depend on a variety of factors, including habitat type and condition, proximity to other leks, unique seasonal habitats, or connectivity, etc. Energy development would likely be limited by proximity to transmission line corridors and substations and would not extend to all PHMA, IHMA or GHMA. Leks in IHMA and GHMA would be at higher risk from effects from energy development due to the reduced buffers and buffer exception under Alternatives 5 and 6 than under Alternative 4.

Livestock Grazing Management

Rangewide Environmental Consequences

Impacts from livestock grazing management under Alternatives 5 and 6 would be the same as described for Alternative 4.

State-Specific Environmental Consequences

In Montana and Dakotas impacts from permitting grazing in CHMA and from reducing the risk of potential impacts from West Nile Virus would be the same as described for Alternative 3.

In Oregon, the 15 key RNAs in Oregon would be retained under Alternatives 5 and 6. Their associated areas allocated as unavailable to grazing are proposed to be retained, modified, or re-allocated to grazing based on district-generated, site-specific updated information since the 2015 ARMPA. The key RNAs would be required to meet land health standards and other applicable BLM regulations and policies and would remain subject to management, including regulation of grazing and invasive plant removal. The amount of land within key RNAs that would be made available to grazing is small relative to the size of the species' range and any impacts of livestock grazing on GRSG populations using these areas would likely be minimal and undetectable.

Although key RNA boundaries are not being modified (with the exception of data updates and clarifications), district site visits and analysis since the 2015 ARMPA have found vegetative communities that would not be consistent with why key RNA designations for sage-grouse habitats were made. They include mountain mahogany vegetation communities (Dry Creek Bench, Mahogany Ridge, Fish Creek Rim, and Spring Mountain Key RNAs) and the old-growth juniper (Black Canyon Key RNA) vegetation community.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternatives 5 and 6 would be similar to those described for Alternative 1. Management within established AML could reduce impacts from wild horses and burros on GRSG in some areas.

Predation Management

Impacts from objectives to reduce opportunities for predators under Alternatives 5 and 6 would be the same as described for Alternative 4. That is, impacts from reducing opportunities for predators would be

similar to those described for Alternative 1 with the exception that precluding new anthropogenic infrastructure would be avoided where possible. There would be a slightly greater potential for new infrastructure to occur, which could attract predators and increase predation on GRSG. Other measures to maintain predation at natural levels would be applied, so this is not expected to increase predation to a level that would influence lek or population persistence and viability.

ACEC Designation

Alternative 5 would not result in any impacts from ACEC designation since it does not include management for ACECs.

Under Alternative 6, impacts would be as described for Alternative 5 except within ACECs as described below.

Impacts from mineral development could occur. Plans of operations for locatable mineral disturbances would reduce effects if measures were included to reduce disturbance to GRSG and habitat alterations.

Managing ACECs as open to fluid mineral leasing subject to NSO stipulations would decrease the HMA acres subject to effects from fluid mineral development. The NSO stipulation could protect these acres from surface-disturbing activities. Limiting surface disturbance would ensure that connectivity between leks would be preserved and not contribute to fragmentation. Including an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if no direct or indirect impacts can be demonstrated is not expected to result in additional impacts.

Managing ACECs as closed to new or expansion of nonenergy minerals associated with existing operations (fringe leases) would reduce potential impacts to GRSG and habitat, such as disturbance and habitat alterations. Managing ACECs as closed to new saleable mineral/mineral material operations for all sale types except for free-use pits would reduce potential impacts to GRSG and habitat but to a lesser extent than if free use pits were also prohibited.

Managing ACECs as exclusion areas for major ROWs and avoidance areas for minor ROWs would reduce potential impacts to GRSG and habitat, such as disturbance, habitat alterations, and increased potential for predation. Managing ACECs as ROW exclusion areas for wind and solar energy development would eliminate the likelihood for GRSG impacts including habitat loss, degradation, fragmentation, and direct disturbance to birds in these areas.

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 4.3.1**, 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.

10.3.2 Alternative 1

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Under Alternative 1 restrictions on land use and surface-disturbing activities would occur within each HMA and SFA (**Table 2-3**) and would limit impacts to vegetation as described under *Nature and Type of Effects*. More restrictive management within SFAs emphasizes protection of GRSG in these areas and would provide the highest level of protection to vegetation. In general, restrictions on land use and surface-disturbing activities in HMA and SFAs would reduce the likelihood of vegetation loss, sagebrush or riparian vegetation fragmentation, and introduction and spread of invasive weeds.

Structural changes to sagebrush shrublands have caused an increase in encroachment of pinyon pine, juniper, and noxious weeds that are replacing native plant communities. Fire suppression, a major contributor to this expansion, has allowed these tree species to encroach more extensively into sagebrush habitats. Treatments designed to prevent encroachment of trees and nonnative species vary across the range and would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities. Fuels treatments, where allowed, would result in either more open-forested conditions, which would improve the habitat for species selecting these habitats, or decreased encroachment of juniper and pinyon species, which would improve habitats for GRSG and other sagebrush-dependent

species. Habitat connectivity for GRSG could be increased over the planning time frame through vegetation manipulation designed to restore vegetation, particularly sagebrush overstory cover.

Alternative 1 would also incorporate an adaptive management strategy composed of soft and hard thresholds based on population and habitat changes. See **Section 4.2.2** for a detailed description of thresholds. In general, an adaptive management strategy would help to ensure that actions are taken to limit impacts to vegetation in an appropriate time frame to offset impacts.

Under Alternative 1, all states would include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. Habitat objectives would be considered when authorizing activities in GRSG habitat. The exact language varies by state, but in general, inclusion of specific habitat objectives would result in improved vegetation conditions. Following these objectives could prevent rangeland not meeting range health standards that degrade vegetation communities, reduce conifer encroachment, and reduce the introduction and spread of invasive weeds.

State-Specific Environmental Consequences

In MT and WY, a 5% disturbance cap would apply to land use activities, including wildfire and agriculture, at the project area scale in PHMA. States with higher disturbance caps could see greater levels of disturbance within a project area, and therefore greater potential for impacts to vegetation as described *under Nature and Types of Effects*. WY has no required mitigation in GHMA potentially increasing impacts to vegetation.

In CO, ID, NV/CA, OR, UT, and the Dakotas, a 3% disturbance cap would apply to land use activities (except wildfire and agriculture) at both BSU-scale and at proposed project analysis area within PHMA. In ID, the same cap would apply but it could be exceeded in utility corridors if it benefits GRSG. Calculating disturbance at the project-level means that the amount of disturbance allowed could not exceed 3% of the site-specific project area; this may prevent some development that could occur if disturbance is only calculated at a coarser scale. In addition to calculating disturbance at the project-level, disturbance would also be calculated for each BSU. Including caps at both project and BSU scales would reduce the likelihood for sagebrush or riparian vegetation removal, degradation, or fragmentation, and improve the acreage and condition of sagebrush vegetation on both the local and landscape scales.

Although all states would include an adaptive management strategy, the metrics, thresholds, timeframes, and spatial scales for evaluating and responding to thresholds would vary state by state. As a result, there would be no consistency in how thresholds are calculated across the range and responses may not be implemented across an area that encompasses an entire population group and/or seasonal habitats needed throughout the year. If management changes do not apply to all populations and habitats being affected, some vegetation communities may improve while others remain impacted.

Minerals Management

Rangewide Environmental Consequences

Leasing of fluid minerals would be allowed in PHMA and IHMA subject to NSO stipulations and/or seasonal restrictions. In general, NSO stipulations on new leases would protect vegetation in PHMA from surface-disturbing activities and would not contribute to fragmentation. Restrictions on mineral development within PHMA and GHMA as described in the 2015 EISs for CA, CO, ID, MO/DK, NV/CA, OR, UT, and WY (BLM 2015a-2015h) would reduce potential impacts to vegetation such as vegetation removal and increased weed spread as described under *Nature and Types of Effects*.

State-Specific Environmental Consequences

In WY, management of PHMA as NSO within 0.6 miles of leks would protect vegetation in these areas, though to a lesser extent than elsewhere rangewide where all PHMA would be NSO. In WY and MT PHMA fluid mineral development in areas that are already leased (and thus are exempt from NSO stipulations) would also be subject to density and disturbance limits. In CO, OR, WY, and UT NSO stipulations within lek buffers (buffer distance varies by state) in GHMA would provide increased protection to vegetation in these areas. PHMA and GHMA in CO and GHMA in OR would be closed to fluid mineral development within 1 mile of leks which would also provide increased protections to vegetation and limit impacts from surface disturbance in these areas. However, development of fluid mineral resources in GHMA would still result in the localized direct loss and fragmentation of vegetation from current use areas outside of the applicable lek buffers. The general effects of mineral development on vegetation are discussed in *Nature and Types of Effects*.

Impacts of development outside buffer areas could be offset by mitigation because operators would be required to mitigate impacts until there is a net conservation gain. However, mitigation may be conducted off-site if it would provide greater benefit to GRSG, potentially resulting in unmitigated impacts on vegetation in GHMA.

Prioritizing leasing outside of PHMA and GHMA within CO, ID, ND, NV/CA, OR, UT, WY, and parts of MT/DK (Billings, HiLine, Miles City, ND, SD) would reduce the potential for impacts to vegetation associated with fluid mineral development as described under *Nature and Type of Effects* in these areas. There would be no similar objective in the Lewistown or Butte Field Offices, and therefore, potential for impacts would be greater. In WY and MT, saleable mineral and nonenergy mineral development in PHMA would also be subject to density and disturbance limits which would also reduce potential impacts to vegetation, but to a lesser extent than if they were completely closed to development. In Idaho, IHMA would be open to nonenergy mineral development in Known Phosphate Lease Areas; therefore, similar impacts (e.g., direct vegetation loss, surface disturbance, and erosion) could occur in areas open to development.

Lands and Realty Management

Rangewide Environmental Consequences

Under Alternative 1, PHMA in all states and ID IHMA would be identified as ROW avoidance areas to allow for management flexibility (except for minor ROWs in WY, as described under state analysis). PHMA would be exclusion areas for wind and solar development (with some differences between states, see state-specific analysis). Classifying PHMA as exclusion or avoidance areas would decrease the potential for impacts associated with ROW development, such as disturbance and increased potential for weed spread, as described *in Nature and Types of Effects*. GHMA in all states would be open to minor ROWs with mitigation measures (except for in WY where mitigation is not required). Impacts associated with ROW development, such as surface disturbance and increased potential for weed spread, could occur in these areas if developed, but mitigation measures would help to offset the impacts.

New ROWs in PHMA would not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in the Proposed RMP Amendment. In IHMA new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. The BLM would collocate new ROWs with existing infrastructure when possible. Alternative 1 would apply a buffer from disturbance around leks in PHMA, IHMA and GHMA, depending on the type of disturbance and based on the latest science (Manier et al. 2014) which would protect vegetation in the buffer. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50% greater than the original

footprint. These measures would protect vegetation from fragmentation and other impacts as described in *Nature and Types of Effects*.

State-Specific Environmental Consequences

PHMA in WY would be open to minor ROWs with buffers and mitigation. Buffers and mitigation would help offset the impacts, but to a lesser extent than ROW exclusion/avoidance. GHMA in WY would be open to minor ROWs and no mitigation measures would be required which would increase the potential for impacts associated in these areas.

Classifying GHMA in CO, NV/CA, and OR as avoidance areas for major ROWs would continue to reduce the potential for impacts associated with ROW development as described *in Nature and Types of Effects*. Opening UT and ID GHMA to major ROWs with minimization measures would increase the potential for impacts, but mitigation measures would help to offset the impacts. Opening GHMA in WY to major ROWs would also increase the potential for impacts, and there would be no mitigation measures to offset the impacts.

Livestock Grazing Management

Under Alternative 1, PHMA and GHMA in all states and ID IHMA would be available for domestic livestock grazing. Therefore, impacts to vegetation from grazing such as increased weed spread as described under *Nature and Types of Effects*, could occur in these areas. The BLM would prioritize SFAs and PHMA outside of SFAs for additional livestock grazing management. This would include the option to adjust permit terms and conditions as needed to meet land health standards and GRSG habitat objectives.

Wild Horse and Burro Management

The BLM within all states where wild horses and burros overlap with GRSG habitat would need to manage populations within established AML, incorporating GRSG habitat objectives into wild horse and burros management. Monitoring wild horses and burros would gather prioritization information for GRSG habitat activities within SFAs, PHMA, IHMA (ID) and GHMA. Under Alternative 1, evaluation of land health assessments in wild horse HMA could identify vegetation conditions that would determine prioritization of areas to reduce wild horse numbers and the associated impacts on vegetation. Disturbances that are found in *Nature and Types of Effects* would have similar grazing impacts and may increase noxious weeds and invasive species presence, while also promoting conifer encroachment. Removing wild horses and burros in those PHMA with existing herd management areas in all states would increase total vegetation, grass abundance and cover, and sagebrush canopy cover, species richness, and dominance of palatable forbs (Manier et al. 2013; Chambers et al. 2017).

Hard thresholds (see **Appendix 2**) represent a trigger indicating that immediate action is necessary to stop a severe deviation from GRSG conservation objectives set forth in the BLM plans. Adaptive management strategies and the potential for changes in management would be consistent between all states and would benefit GRSG habitat, especially in wild horse and burro areas. However, there is no consistency in the specific thresholds between states or the strategies associated with responding to those thresholds. The metrics, thresholds, and timeframes and spatial scales vary state by state, as does the level of detail that explains each of these. Similarly, the responses associated with adaptive management thresholds vary by state, with some prescribing specific actions and others identifying teams to develop a response.

10.3.3 Alternative 2

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Areas managed as HMAs would vary slightly from Alternative 1 (**Table 2-3**). Rangewide effects to vegetation from GRSG habitat management and conifer encroachment treatment under Alternative 2, would be the same as those described for Alternative 1.

State-Specific Environmental Consequences

Removing SFAs in UT, WY, NV, and ID would reduce protections to vegetation by removing restrictions on land use and surface-disturbing activities in those areas. However, previous management area classifications (e.g., PHMA) would remain, but protections may be lower than what is required in SFAs. Protections afforded to vegetation from restrictions to land use and surface-disturbing activities would continue in SFAs in MT and OR, where the habitat classification would be retained; impacts would be as described under Alternative 1.

Under Alternative 2, the GHMA designation in UT would be removed with all its corresponding management actions. This would likely incentivize development in areas formally identified as GHMA, and could lead to vegetation loss, sagebrush or riparian vegetation fragmentation, and increased weed spread.

Requirements for mitigation that achieves a net conservation gain in all HMA types would apply in MT/DK, NV/CA, and OR, and impacts would be the same as described for Alternative 1. CO and ID would enforce mitigation resulting in no net loss in HMA. This would help offset impacts associated with land use activities, as described under *Nature and Types of Effects*, but to a lesser extent than Alternative 1, in which a net conservation gain would be required. In UT and WY, the net conservation gain requirement would be removed, which would increase potential for impacts.

Although the BLM would not require compensatory mitigation in HMA, it would enforce state mitigation policies and programs. In CO, ID, NV/CA, OR, UT, and WY HMA, compensatory mitigation would be voluntary unless required by laws other than FLPMA or by the State. As a result, the potential for impacts from land use activities, as described under *Nature and Types of Effects*, would increase relative to Alternative 1, in which a net conservation gain would be required.

Impacts from applying a 3% (CO, ID, NV/CA, OR, UT, and Dakotas) or 5% (MT and WY) disturbance cap in PHMA would be similar to those described for Alternative 1. However, in UT and ID the cap could be exceeded if it would benefit GRSG. The cap would be applied at the BSU and project scale, except in ID which would only apply it at the BSU scale. Consequently, some additional development could occur in ID, which may increase potential for impacts to vegetation compared to Alternative 1.

Impacts of including an adaptive management strategy would be similar to those described for Alternative 1. However, some states would include the addition of "un-triggers", meaning that the management change implemented to reverse a threshold could be revoked and the original management would be reimplemented once the issue is resolved. Reverting to the original management that resulted in the threshold being met would likely lead to impacts to vegetation that could cause the threshold to be met again.

Minerals Management

Rangewide Environmental Consequences

Impacts from mineral development would generally be the same as described for Alternative 1 except for slight differences among the states (see state-specific analyses). Removing the recommendation for locatable

mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) would have no on the ground impact. The Secretary proposes and makes withdrawals according to a separate process pursuant to section 204 of FLPMA not through the BLM land use planning.

State-Specific Environmental Consequences

Removing the CO PHMA closure to fluid mineral development would increase potential for disturbance and vegetation loss or degradation. This is because mineral development activities could occur in previously closed areas and cause impacts as described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts to vegetation because the NSO stipulation would avoid potential for disturbance and associated impacts due to surface-disturbing activities.

Impacts from prioritizing fluid mineral leasing outside of HMA in CO, ID, OR, and MT/DK offices would result in the same impacts as described under Alternative 1. Removing the objective in UT, NV/CA would increase the potential for impacts because land in PHMA and GHMA could be leased. In WY, fluid mineral leasing would be allowed in PHMA, which would increase the potential for impacts. However, if the BLM has a backlog of Expressions of Interest for leasing, the BLM would prioritize work first in non-habitat followed by lower habitat management areas (e.g., GHMA). For fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts consistent with lessees' rights.

Adding an exception criterion to saleable and nonenergy mineral closures for NV/CA PHMA with free use permits and allowing consideration of new free use permits for saleable minerals in ID IHMA would increase the chance for activities to occur in these areas and thus the potential for associated impacts as described in *Nature and Types of Effects* would be greater.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from ROW management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA, see state-specific analysis).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development.

Livestock Grazing Management

Impacts from domestic livestock grazing management would generally be the same as described for Alternative 1, with differences across states as described below.

State-Specific Environmental Consequences

Removing SFAs in UT, WY, NV, and ID would remove the prioritization for review and processing of grazing permits in these areas. However, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Adding clarification of habitat objectives to land health standards in WY, ID, and NV and clarifications on grazing in riparian areas and management of range improvements in WY may, in some cases, help move vegetation toward desired conditions.

In OR, livestock grazing in the 13 key RNAs would be returned to language that pre-dated the 2015 amendments. Because this language would not specifically address habitat objectives for GRSG, these habitat objectives may not be met, and potential for impacts to vegetation and overall vegetation degradation would increase relative to Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management in Alternative 2 would be the same as Alternative 1, except for the removal of references to SFAs for the states that removed them, and removal of the reference to GHMA in UT, which removed that HMA type under this alternative. This would potentially lead to disturbances in extensive portions of the PHMA, IHMA, and GHMA that aren't required to protect SFAs. Disturbances to these areas, see *Nature and Types of Effects*, would increase the likelihood of native vegetation degradation and fragmentation for GRSG habitat with an increase in bare ground soils that would potentially increase noxious weeds and invasive species establishment and conifer encroachment.

10.3.4 Alternative 3

Greater Sage-Grouse Management

Under Alternative 3, the BLM would manage the largest acreage of HMAs, all as PHMA (**Table 2-3**). In addition, the BLM would manage ACECs for GRSG. Conifer encroachment impacts and treatments for Alternative 3 would be the same as those described for Alternative 1. Management actions for PHMA would be more restrictive and designed to promote GRSG conservation to a greater extent in areas previously designated as GHMA. Therefore, managing previously designated GHMA as PHMA would minimize potential impacts to vegetation to a greater extent than if they remained managed as GHMA. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would also increase protections for and minimize impacts to vegetation.

Classifying previously designated SFAs as PHMA would likely not reduce protections to vegetation rangewide. This is because although management actions for PHMA would be less restrictive than those for SFAs under other alternatives, the management restrictions in PHMA under this alternative would be more restrictive than Alternatives 1 and 2 (e.g., PHMA would be closed to fluid, saleable, and nonenergy minerals) and applied to a greater overall area.

Impacts from mitigation would be similar to those described for Alternative 1, as the BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types. An emphasis would be placed on avoiding impacts, which would reduce potential for effects. Additionally, compensatory mitigation would need to fully offset any residual effects on habitat function and value and at the scale necessary to meet the RMP GRSG goals and objectives. These requirements would reduce the potential for impacts from land use activities, such as direct vegetation loss and sagebrush or riparian vegetation fragmentation.

The BLM would apply a 3% cap for new and pre-existing authorizations for infrastructure, wildfire, and agriculture (subject to valid existing rights) at the project scale and within HAF fine scale habitat selection area while honoring valid existing rights. Calculating disturbance at the project scale and HAF fine scale habitat selection area may prevent some development, and therefore reduce impacts to vegetation. Because fine scale HAFs typically represent a local population's home range and are determined in part by the quality and juxtaposition of resources within and between seasonal habitats, reducing disturbance in these areas may help to reduce sagebrush or riparian vegetation fragmentation and impacts to vegetation from surface disturbance.

Effects to vegetation from habitat management and conservation would be similar to those described for Alternative 1, however, Alternative 3 would include additional objectives to maintain existing connectivity between GRSG populations. Maintaining connectivity would reduce the potential for increased sagebrush or riparian vegetation fragmentation. Adaptive management would more accurately reflect GRSG habitat conditions and strive to better manage vegetation to support GRSG.

Minerals Management

Closing PHMA in all states to fluid mineral leasing, saleable minerals, and nonenergy minerals would reduce the potential for impacts to vegetation, such as direct vegetation loss, increased fragmentation, and increased weed spread as described under the *Nature and Types of Effects*. Impacts would be reduced to a greater extent than Alternatives 1 and 2 because areas closed to leasing could not be developed at any point.

Recommending PHMA for withdrawal from location and entry under the United States mining laws would have no impact. However, if the BLM were to apply for a withdrawal pursuant to section 204 of FLPMA and the Secretary were to accept the application, the BLM could initiate the process to withdraw PHMA. A withdrawal would reduce potential impacts to vegetation associated with locatable mineral development as described under *Nature and Types of Effects* since surface disturbance associated with location and entry would be less likely to occur in withdrawn areas.

Lands and Realty Management

Under Alternative 3, all PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. These restrictions would decrease the potential for impacts to vegetation in PHMA to a greater extent than under Alternatives 1 and 2. However, the inability to site ROWs in PHMA could lead to longer ROW routes in order to bypass closed areas which would in turn increase surface disturbance overall and other impacts of ROW siting on vegetation outside of PHMA.

Livestock Grazing Management

Under Alternative 3, all PHMA would be unavailable for domestic livestock grazing. As a result, livestock would be removed from PHMA and impacts to vegetation associated with livestock grazing, as described under *Nature and Types of Effects* would not occur. Alternative 3 would reduce the likelihood for spread of weeds, would allow for native understory perennial plant recovery, and would increase herbaceous vegetation cover (Strand and Launchbaugh 2014). Not utilizing livestock as a tool available for implementing fuels management treatments or invasive species control in sagebrush habitat areas could make PHMA more susceptible to a large-scale wildfire that would decrease native vegetation and increase the potential for noxious weed and invasive species growth in sagebrush vegetation communities within PHMA. Increased risk of wildfire would decrease protection of sagebrush habitats and may require repeated post-fire rehabilitation treatments to recover habitat function and continuity.

Wild Horse and Burro Management

Under Alternative 3, no wild horse and burro herd management areas would be designated in PHMA and wild horses and burros would be removed in areas where there are currently herd management areas. This could potentially increase protections for native plant communities within PHMA and decrease the potential for introduction and spread of noxious weeds and invasive species. Reducing ground disturbances to the herd management areas in PHMA would improve GRSG habitat and would assist in reducing the potential for conifer encroachment opportunities from compacted and bare soils.

10.3.5 Alternative 4

Greater Sage-Grouse Management

Under Alternative 4, more PHMA and less GHMA would be managed than Alternatives 1 and 2 (**Table 2-3**). Restrictions within HMAs would improve GRSG habitat by increasing acres and conditions of vegetation communities, connect sagebrush or riparian vegetation fragmented areas, mitigate noxious weed or invasive species introduction and spread, and decrease conifer encroachment. HMA protections would be expanded to new areas based on updated science.

The disturbance cap would be applicable to new authorizations under Alternative 4. Disturbance cap calculations would also be specific to activities that would remove vegetation and increase the potential for noxious weeds due to an increase in bare-ground areas. This would require more mitigation that could assist in preserving native vegetation populations or reducing invasive plants and noxious weeds for GRSG management. However, areas of GRSG non-habitat within the HMA boundaries would either be removed from the HMA or would be recategorized with decreased protections. Removing areas from HMA classification would have noticeable impacts to native vegetation in those areas and increase the potential for noxious and invasive species as well as soil degradation from surface disturbing activities. The 3% disturbance cap would include all acres of habitat classified as PHMA (and IHMA in Idaho). Areas outside those designations could experience disturbance and be converted to an earlier seral stage that would change vegetation community succession and reduce the extent of native plant communities.

As under Alternative 1, the BLM would continue to include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations under Alternative 4. However, habitat objectives tables would be updated based on best available science which would reinforce current or provide new thresholds. The updated language would allow for flexible management that could identify problems sooner and assist in reducing potential vegetation disturbances and invasive plants and noxious weeds spread. Impacts from adaptive management would be as described for Alternative 3.

Minerals Management

Alternative 4 and NSO stipulations would be similar to Alternative 1, including in WY where the NSO stipulations would be expanded to include all of PHMA. Leasing would be focused to areas that have the least potential for conflicts. The BLM would evaluate parcels identified in Expressions of Interest (EOIs) associated with GRSG HMA and determine which to potentially analyze for potential inclusion in a lease sale. This would be applied to a larger area compared with Alternative 1 due to the increase in acres that would be managed as PHMA. As a result, Alternative 4 could reduce fragmentation of vegetation communities and could maintain the extent and condition of native populations where development doesn't occur.

The BLM would work with project proponents to promote measurable GRSG conservation objectives such as, but not limited to, consolidation of project related infrastructure to reduce habitat fragmentation and loss and to promote effective conservation and connectivity of seasonal habitats and PHMA (and IHMA). Vegetation communities in HMA that are considered to have least potential for conflicts with GRSG management and therefore more likely to be considered for development would see a potential increase in impacts to vegetation communities and in invasive plants and noxious weeds.

Lands and Realty Management

Alternative 4 would be similar to Alternative 1 with varying PHMA and IHMA exclusions for utility scaled ROWs. State-specific differences for facilities and activities would be guided by the strategy to avoid,

minimize, or mitigate impacts on GRSG habitat. Wind and solar energy development would be excluded in PHMA and within specified areas of IHMA. Vegetation and soils disturbance from energy development would be eliminated in GRSG habitat containing sagebrush/perennial grass vegetation communities. By exclusion of development, the vegetation and soil conditions would neither be adversely nor beneficially impacted, but rather maintain current conditions and trends. Alternative 4 would exclude wind and solar energy testing and generation facilities in PHMA and in IHMA exclusions would apply within 3.1 miles from active leks that would reduce impacts compared to Alternative 1. Maintaining current conditions in PHMA and IHMA would provide consistent habitat for GRSG, reduce noxious weed and invasive species introduction, and decrease sagebrush or riparian vegetation fragmentation.

Livestock Grazing Management

Impacts to GRSG habitat from Alternative 4 would be the same as Alternative 1, although no SFAs would be managed under Alternative 4. As a result, these areas would not receive additional priority for grazing management. However, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Alternative 4 is similar to Alternative 1 with the exception of references to SFAs, for all states, would be removed from the management plan. Removal of SFAs would have similar impacts to vegetation communities as states that have removed them under Alternative 2.

10.3.6 Alternative 5

Greater Sage-Grouse Management

Under Alternative 5, more PHMA and less GHMA would be managed than Alternatives 1 and 2 (**Table 2-3**). Lands would be managed for avoiding and minimizing direct and indirect disturbances on sagebrush vegetation and sagebrush communities that would require compensatory mitigation to achieve no net habitat loss. Alternative 5 habitat objectives would be similar to Alternative 4. Impacts from adaptive management would be as described for Alternative 3.

Minerals Management

Under Alternatives 5, fluid mineral development could be more flexible compared with Alternative 1 due to WEMs, though adherence to the WEM criteria would ensure no impacts to GRSG within 0.6 miles of leks or provide for off-setting effects through compensatory mitigation in PHMA beyond 0.6 miles (except in WY, where the NSO only applies within 0.6 miles). In addition, compensatory mitigation could be used more frequently under Alternative 5 to offset both direct and indirect adverse impacts on riparian and sagebrush habitats in PHMA and GHMA. Protective effects of PHMA would increase under Alternative 5 compared to Alternative 1, as PHMA would be expanded (**Table 2-3**). Approved fluid mineral developments would cause surface disturbances that would lead to vegetation community degradation, sagebrush or riparian vegetation fragmentation, and increases in noxious weeds and invasive species presence.

Lands and Realty Management

Avoidance for utility scale wind and solar in Alternative 5 would be similar to management under Alternative 1 but would keep GHMA open for utility scale projects with minimization measurements. This would result in more impacts on native vegetation and GRSG habitats from renewable energy development, in comparison to Alternative 1 where GHMA are only open in ID and WY for solar and wind. Under Alternatives 5, GRSG habitat would be fragmented from new ROWs in GHMA resulting in an increase in

the potential for invasive species and noxious weeds throughout the open ROW areas from impacts as described under *Nature and Types of Effects*.

Livestock Grazing Management

Impacts from livestock grazing management under Alternative 5 would be the same as those described for Alternative 4.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be the same as described for Alternative 4. Under Alternative 5, the BLM would manage WHB populations within their established AML levels and would reduce the potential for impacts from wild horses and burros on vegetation such as those described under Nature and Type of Effects, compared with Alternatives 1, 2, and 4.

10.3.7 Alternative 6

All impacts would be the same as described for Alternative 5 except for those from ACECs. ACECs under Alternative 6 would cover the same areas as Alternative 3 and would provide further protection to vegetation communities from surface disturbing activities as described under *Nature and Types of Effects*.

10.4 WILDLAND FIRE ECOLOGY AND MANAGEMENT

10.4.1 Methods and Assumptions

Methodology

Impacts on wildland fire ecology and management would primarily result from management actions described in **Chapter 2** that would change the BLM's ability to control the amount or location of fuels. The types of actions that can result in these impacts are discussed in more detail in **Section 4.4.1**, 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

The indicator 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.

10.4.2 Alternative 1

A comprehensive strategy for wildland fire management would be implemented under Alternative 1, including the FIAT. The FIAT would identify PHMA areas and management strategies to reduce the threats to GRSG from invasive annual grasses, wildfires, and conifer expansion. It would incorporate recent scientific

research on resistance and resilience of Great Basin ecosystems as well as interdisciplinary team knowledge. Potential management strategies include proactive measures, such as fuels management and habitat restoration and recovery, and reactive measures, such as fire operations and post-fire rehabilitation. Together, these actions would improve wildland fire management, given the limited resources available, and would target those areas that need most protection. The likelihood for wildfire would be reduced and subsequent impacts on vegetation, particularly vegetation that meets GRSG habitat requirements, described under **Section 3.2**. would also be reduced. Providing adequate rest from livestock grazing would improve the likelihood that ESR seedings would stabilize the site, compete effectively against invasive annuals, and successfully establish native vegetation over the long term.

10.4.3 Alternative 2

Impacts on wildland fire management under Alternative 2 would be the same as described for Alternative 1.

10.4.4 Alternative 3

Under Alternative 3, all PHMA and proposed ACECs would be unavailable for livestock grazing. This could limit the BLM's ability to achieve resource objectives as described under the *Nature and Type of Effects* and could alter the risk of large-scale wildfires.

10.4.5 Alternative 4

Impacts on wildland fire management under Alternative 4 would be the same as described for Alternative 1.

10.4.6 Alternatives 5 and 6

Impacts on wildland fire management under Alternatives 5 and 6 would be the same as described for Alternative 1.

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.

10.5.2 Alternative 1

Under Alternative 1, lands would be managed to conserve, enhance, and restore sagebrush ecosystems. By separating GRSG habitat into SFAs, PHMAs, IHMAs, and GHMAs, management actions would then be applied within identified designations, as well as in certain areas outside of PHMA, IHMA, and GHMA, including vegetation objectives to achieve improvements in GRSG habitat. SFA designations would have the most restrictions, and therefore the most protection for wildlife species that occupy these habitat types. However, restrictions to development on BLM lands might push development onto private land, which could result in indirect impacts as described under *Nature and Types of Effects*.

In most of the planning area, priority will continue to be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs, or within the least impactful areas within PHMA, IHMA, and GHMA if avoidance is not possible. Applying a disturbance cap can help reduce effects to wildlife within the areas, as well as applying seasonal restriction when wildlife species are more vulnerable to disturbance. Impacts on wildlife species from mineral development would be as described under *Nature and Types of Effects*. Allowing exceptions to lease stipulations, COAs, and terms and conditions to be considered on a case-by-case basis during restricted time periods could lead to additional surface disturbing activities and functional habitat loss. It is unknown, however, what type or degree of exceptions would occur, because the outcome is dependent on each lease and the habitat where the lease is being developed.

Fluid Minerals Management

Under Alternative 1, restrictions on fluid mineral leasing, application of the disturbance cap, and use of conservation measures would reduce the extent of direct habitat loss for terrestrial wildlife species whose ranges overlap PHMA. However, scale of disturbance (both direct and indirect) would depend on lease size and configuration. In instances where several small leases occur entirely within PHMA or the 4-mile lek perimeter, pad and road development may have substantial impacts on wildlife species. Excluding or reducing surface-disturbing activities in PHMA would shift development into other areas and may influence those species that use non-sagebrush communities for nesting, cover, and forage.

Under this alternative, NSO and CSU stipulations would be applied to protect GRSG, which would further reduce wildlife habitat loss and degradation caused by fluid mineral development. While GHMA would be available for fluid minerals leasing and other types of minerals and energy development, such activities would be subject to conservation measures (i.e., net conservation gain, lek buffers, and RDFs). This would generally have a local protective impact on some wildlife in those areas.

The primary impacts on wildlife species (especially big game) from minerals development within the planning area would be the reduction in usable wildlife habitat and disruption of migration corridors that link crucial habitats (winter range) and parturition areas. Reductions would be particularly severe in areas with continuous surface disturbance. As discussed by (Bartmann et al. 1992), crowding of animals may have a density-dependent impact of reducing animal survival and damaging resources. Human disturbance of big game results in increased energy costs (Bromley 1985) and disturbed big game animals incur a physiological cost, either through excitement (preparation for exertion) or locomotion. A fleeing or displaced animal incurs additional costs through loss of food intake and potential displacement to poorer (lower) quality habitat. If the disturbance becomes chronic or continuous, these costs can result in reduced animal fitness and reproductive potential (Geist 1978). Additionally, a fleeing or displaced animal is also more visible to predators and at a higher risk for predation. Displacement of fluid mineral development outside of suitable GRSG habitats could negatively affect raptors and migratory birds that commonly nest in pinyon-juniper and other treed areas. Direct removal or modification that compromises nest stand character would reduce the habitat quality or carrying capacity for local raptor and migratory bird populations.

Saleable Mineral Management

All saleable mineral pits located in PHMA that are no longer in use would be restored to meet GRSG habitat conservation objectives. As such, this alternative would benefit those wildlife species whose ranges and habitats are coincident with PHMA. Surface-disturbing activities from saleable minerals development would be relocated outside of PHMA. This would result in habitat loss or modification of other vegetation types (mountain shrub and pinyon-juniper), with negative impacts on those wildlife species associated with non-sagebrush communities.

Nonenergy Leasable Minerals

Under Alternative 1, no new nonenergy mineral leasing would be allowed in PHMA and existing mines would not be permitted to expand. RDFs would be applied for solution mining wells in PHMA. By reducing the amount of direct habitat loss, this alternative would retain habitat for terrestrial wildlife species whose ranges or habitats are coincident with PHMA.

Locatable Minerals Management

SFAs were recommended for withdrawal from the Mining Law of 1872, as amended. Such a withdrawal, if it occurs, would close the SFA to location and entry under the Mining Law of 1872, subject to valid existing rights. The BLM would request that operators include appropriate mitigation and applicable seasonal restrictions in plans of operation which would reduce impacts on fish and wildlife.

Lands and Realty Management

Under Alternative 1, PHMA in CO, NV/CA, ID, and OR would be managed as an avoidance area. ROW projects would be allowed in PHMA if the project would not adversely affect GRSG populations. GHMA would also be managed as avoidance for ROWs. Additionally, no aboveground structures would be authorized within 1 mile of active leks in occupied habitat. As a result, protections would be greater under

this alternative for those species that overlap all GRSG habitat. Both PHMA and GHMA would be managed as avoidance for large transmission lines, except for several ongoing projects.

Alternative 1 in UT would provide management flexibility in developing infrastructure, focusing on GRSG habitat. PHMA would be ROW avoidance for new linear and site type ROWs, permits, and leases; high voltage transmission lines ROWs (100 kV or greater); major pipelines; and communication sites. Additional protection would be provided by managing PHMA and GHMA as ROW exclusions areas for solar energy development and PHMA as ROW exclusion areas for wind energy development. RDFs would be applied to further reduce impacts. Ensuring a net conservation gain to GRSG under the regional mitigation strategy may require projects to avoid, minimize, or mitigate for their potential impacts on GRSG, which could reduce the loss or disturbance of habitat from specific projects. Offsite mitigation may not always benefit species impacted at the disturbed site. Therefore, there could be a local impact on certain species.

In WY there would be an increase in ROW avoidance areas that could reduce ROW construction activities and related impacts to wildlife habitat. Existing ROWs would be used whenever possible for placement of new linear facilities, which would minimize overall habitat loss and fragmentation. Exceptions could occur, and in those cases, disturbance is to be limited and mitigated. New projects would have seasonal stipulations that would help prevent disturbance to wildlife species during those timeframes. Management for construction would consider impacts to GRSG populations and be designed to minimize impacts through project design and mitigation. The considerations could reduce the impacts from disturbance and habitat loss for other wildlife species. Requiring raptor perching deterrents could reduce the effects to prey species from hunting by predatory bird species; however, predatory birds would not benefit from hunting perches.

Under Alternative 1, a 3% disturbance cap (5% on lands in WY and MT which would include fire, agriculture, and urban development [MT only]) on discrete anthropogenic disturbances would be applied in PHMA and IHMA in ID, at both the BSU and project levels. Additionally, a limit would be placed on the density of energy and mineral development facilities, which would reduce impacts on wildlife habitat caused by such disturbances. Including transmission lines outside of transmission corridors in the 5% disturbance calculation could reduce wildlife habitat loss and reduce disruptions in habitat connectivity. Disturbance and development can create travel or migration barriers which can alter distribution patterns, increasing stress and energy loss and fitness in wildlife species.

Renewable Energy Management

Under Alternative 1, renewable energy development would be permitted in some states. As a result, sagebrush associated wildlife species would experience reduced potential for disturbance, habitat alterations, and habitat fragmentation as described *in Nature and Types of Effects*. Within exclusion areas, direct impacts would be eliminated on wildlife species, but development in avoidance areas would have more effects on wildlife as some development would occur on a case-by-case basis. Impacts include altered habitat, habitat fragmentation, and noise associated with development. Additionally, the potential exists for both solar and wind facilities to cause direct mortality of some wildlife, particularly birds and bats (Frick et al. 2015; DOE 2021).

Mitigation and Adaptive Management

Under Alternative 1, anthropogenic disturbances in PHMA, IHMA, and GHMA would be mitigated to ensure a net conservation gain to GRSG, which would also maintain habitat for other wildlife species that use GRSG habitat. Conservation measures would be imposed to complement mitigation and further reduce anthropogenic disturbance in PHMA and GHMA, including RDFs and lek buffers.

Application of Habitat Objectives

The habitat objectives would identify the desired outcome for habitat on BLM-administered lands in all GRSG HMAs. Some wildlife species that co-exist in sagebrush communities with GRSG and which have similar habitat requirements would benefit most from the desired habitat conditions. These include management of activities to support suitable GRSG habitat at multiple scales, supporting connected mosaics of sagebrush to provide seasonal habitats and dispersal. The specific tables identifying indicators and benchmarks supported by various scientific publications throughout the range would be retained in the monitoring appendix as a tool through which suitability is informed.

Livestock Grazing Management

Under this alternative, site-specific reviews during grazing permit renewals could allow for adjustments to the number of AUMs on federal lands. Within SFAs, the prioritization of grazing permit/lease reviews not meeting Land Health Standards for special status species, especially in areas containing riparian and wet meadow vegetation, would improve these habitats. Riparian and wet meadow areas are critical for fish and wildlife, serving as essential habitat for breeding, feeding, and shelter.

Adjustments in grazing use or management of BLM-administered lands to meet Standards for Rangeland Health could minimize the impacts of grazing on fish and wildlife by improving habitat conditions. These actions could help sustain wildlife populations, particularly species dependent on sensitive habitats, such as riparian zones. Reducing the intensity of grazing in these areas could decrease soil compaction, enhance water quality, and restore vegetation structure, which is important for species and habitats.

Improved grazing management could also result in overall landscape health improvements, reducing the spread of invasive, nonnative plant species that threaten native wildlife habitats. These actions would provide greater forage and cover for wildlife, particularly in riparian areas, and contribute to maintaining biodiversity by balancing the needs of livestock with habitat conservation for fish and wildlife species.

Wild Horse and Burro Management

Alternative 1 would place some restrictions on the management of wild horses and burros, however the BLM would consider all resource values in conjunction with GRSG when managing wild horses. These management strategies would benefit wildlife species whose ranges overlap herd management areas within PHMA or GHMA. Management within the established levels of AMLs could reduce impacts from wild horses and burros on fish and wildlife in some areas.

ACEC Designation

Alternative 1 does not include management for ACECs.

10.5.3 Alternative 2

Habitat Management Area Designation

Impacts from designating GRSG habitat as SFAs, PHMA, IHMAs, and GHMA (**Table 2-3**) would be similar to those described for Alternative 1. However, some SFAs would be removed in states as described under state impacts. Impacts from language to maintain and enhance sagebrush habitats would be the same as described for Alternative 1.

Removal of GHMA in UT and associated management may reduce some indirect protection for all wildlife species, including crucial habitat for big game species that rely on the area for wintering and fawning/calving within mapped GHMA. Impacts on big game are considered negligible because big game uses a variety of habitat types beyond sagebrush. Additionally, GHMA is not the only management for these areas but is

merely complimentary to management of habitat under applicable RMPs and according to the BLM Land Health Standards. Removing GHMA minimization measures that, as noted above would not preclude development, would not likely result in additional impacts that are not already addressed by management of crucial habitats in existing land use plans.

The offsite mitigation in PHMA to replace impacted habitat in occupied GRSG habitat outside of PHMA may not always benefit the same other wildlife species that were impacted at the disturbed site. While it could lead to a local improvement for species in treated areas, especially those that rely on sagebrush habitats, it could also result in an unmitigated loss in the quantity and quality of habitat at the location of the impact. As the amount of development increases in the GRSG habitat outside PHMA, the impact from disturbances mitigated in PHMA would mount and could affect the use patterns of wildlife in those areas.

Fluid Minerals Management

Impacts on fish and wildlife species from the leasing objective would be similar to Alternative 1, except it would not be relevant in UT or NV/CA. In WY, leasing would be allowed in PHMA, which would increase the potential for impacts on wildlife species that occupy PHMA and surrounding habitat. Impacts from fluid mineral development is discussed under *Nature and Types of Effects*.

Impacts on fish and wildlife species from WEMs would be similar to Alternative 1, except that they would no longer be applied in NV/CA and UT. Allowing placement of developments in non-habitat portions of PHMA may increase impacts on certain wildlife and migratory birds whose habitat requirements do not overlap sagebrush areas. Adjacent non-sagebrush habitats could see an increase in development and disturbance when trying to avoid and minimize disturbance to sagebrush communities.

Saleable Mineral Management, Nonenergy Leasable Minerals, and Locatable Minerals

Impacts on wildlife species would be the same as Alternative 1, except PHMA in ID allows consideration of new free use permits and NV/CA added exception criteria to the closure. Increased potential for related impacts as outlined in *Nature and Types of Effects* would result from providing consideration of new free use permits for saleable minerals in ID IHMA and adding an exemption criterion to saleable and nonenergy mineral closures for NV/CA PHMA. This is because there would be a higher likelihood of saleable and/or nonenergy mineral activities taking place in these areas. Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) has no impact. This is because a recommendation to withdraw lands under the Mining Law of 1872 has no impact. The Secretary proposes and makes withdrawals not through the BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Lands and Realty

Under Alternative 2, impacts from ROWs on wildlife species would be the same as Alternative 1, with additional exception criteria added in Nevada. Alternative 2 proposes to remove the requirement to consider burying transmission lines (except when not technically feasible) and allow increased flexibility to consider site-specific impacts and minimization options. This action could impact wildlife such migratory birds, small mammals, and reptiles by increasing predator perches from unburied lines that may lead to increased take of migratory birds and their nests by raptors and corvids; however, impacts of predator perches could be minimized on a site-scale by use of perch deterrents on poles. Additionally, Alternative 2 would result in more aboveground power lines that increases the risk of birds and bat collisions (Frick et al. 2017). There could be beneficial impacts on big game and migratory bird habitat by not burying transmission lines because it offers more protection for sensitive habitat areas. Removal of sagebrush and associated

vegetation can be avoided with placement of surface lines, which minimizes habitat disturbance and potential for weeds.

In addition, there would be a 3% disturbance cap, not including wildfire or agriculture for CO, ID, NV/CA, OR, UT, and the Dakotas. In UT the cap may be exceeded if it will benefit GRSG. The 3% cap may be exceeded at either scale if a technical team determines that site specific GRSG habitat and population information, combined with project design elements indicates the project will improve the condition of GRSG habitat within the proposed project analysis area or within the PHMA in the population area where the project is located. Factors considered by the team will include GRSG abundance and trends, movement patterns, habitat amount and quality, extent and alignment of project disturbance, location and density of existing disturbance, project design options and other biological factors. Such exceptions to the 3% disturbance cap may only be approved by the BLM Authorized Officer with the concurrence of the State Director. The finding and recommendation shall be made by the technical team, which should consist of, at least, a BLM field biologist, other local GRSG experts, and biologists and other representatives from the appropriate State of Utah agency.

Allowing exceedances to the disturbance and density caps in PHMA could affect wildlife by a reduced level of protection for habitat from disturbance. These disturbance impacts may increase by allowing exceptions to the disturbance cap, especially within areas of non-sagebrush, therefore impacting wildlife species that use these other habitat types (e.g., pinyon-juniper woodlands and pinyon jays); however, exceptions to the disturbance and density cap may also benefit some wildlife species with habitats that overlap with GRSG. This would come about by improving habitat conditions through the increased potential for voluntary vegetation treatments.

Renewable Energy Management

Impacts from renewable energy would be similar under Alternative 1. However, in Nevada, PHMA would have additional exception criteria added. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development. These impacts are described under *Nature and Types of Effects*.

Mitigation and Adaptive Management

Maintaining a mitigation strategy in PHMA that leads to a planning area-wide improvement of GRSG habitat would include management for vegetation communities. Generally, these areas include habitats that are dominated by grasses and shrubs rather than by trees. However, the removal of trees such as pinyon and juniper are included in some habitat management strategies. While each individual project proponent would no longer be required to increase habitat to obtain an authorization for use of public lands, the effects of habitat improvements that were described in the 2015 Final EIS would continue to be achieved: namely, increasing the quantity and quality of sage-steppe vegetation communities in early- to mid-seral condition. Additionally, the effects of habitat improvements would still occur where voluntary mitigation occurs. This would increase habitats for wildlife species with habitats that overlap that of GRSG; however, it would also generally decrease habitat availability for wildlife species or seasonal habitats of species that are not sage dependent.

Application of Habitat Objectives

Impacts from habitat objectives would be the same as for Alternative 1.

Livestock Grazing Management

Impacts from domestic livestock grazing management would be the same as described for Alternative 1, except for in the states described below. In UT, WY, and NV/CA, the prioritization for review and processing of grazing permits was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Impacts on fish and wildlife species would be the same as described under Alternative 1.

ACEC Designation

Impacts on fish and wildlife species would be the same as described under Alternative 1.

10.5.4 Alternative 3

Habitat Management Area Designation

Managing the largest area as PHMA would minimize potential impacts on wildlife species that occupy previously designated GHMA as there would be more restrictions in the areas. Expanding PHMA in some states to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA would also decrease potential for disturbance to sagebrush associated wildlife species and habitat alterations because management restrictions associated with PHMA would occur over a larger area.

Minerals Management

Closing PHMA in all states to fluid mineral leasing, saleable minerals, and nonenergy minerals would reduce potential impacts to wildlife that occupy GRSG range, such as disturbance and habitat alterations. The type of impacts associated with mineral development are described in detail under *Nature and Types of Effects*. Compared to the other Alternatives 1 and 2, the impacts would be lessened. This is because areas closed to leasing would not be developed and there would be a decrease of HMA acres that would be subjected to effects from mineral development. Closing PHMA to mineral leasing and development would protect habitat for wildlife in these areas from surface-disturbing activities as well as subsurface activities (e.g., directional drilling), maintain connectivity between leks and big game habitat, and not contribute to fragmentation. Sagebrush associated wildlife would not be exposed to disruption that is often associated with the noise and human activity that accompanies construction, development, or production activities in PHMA. However, restrictions to development on BLM lands might push development onto state, tribal, or private land, which could result in indirect as described under *Nature and Types of Effects*.

Recommending PHMA for withdrawal from location and entry under the United States mining laws would have no impact. However, if the BLM were to apply for a withdrawal pursuant to section 204 of FLPMA and the Secretary were to accept the application, the BLM could initiate the process to consider withdrawing PHMA from location and entry under the Mining Law of 1872. Such a withdrawal would reduce potential impacts to wildlife associated with GRSG range and habitat associated with locatable minerals as described under *Nature and Types of Effects*. This is because surface disturbance associated with location and entry would be less likely to occur in withdrawn areas because only claimants who demonstrate a valid existing right would be able to proceed.

Excluding or reducing surface-disturbing activities in PHMA could shift development into habitats outside of PHMA. This may influence those species that use non-sagebrush communities for nesting, cover, and forage. Of note would be woodland raptors and migratory birds that commonly nest in pinyon-juniper. Direct removal or modification that compromises nest stand character would reduce the habitat quality or carrying

capacity for local raptor and migratory bird. Additional development in habitats outside of PHMA would affect small mammals and big game populations and connectivity between habitats could be reduced by habitat loss and degradation. This would depend largely on the amount and distribution of development.

Lands and Realty

Compared to Alternatives 1 and 2, new infrastructure development would be far more restricted. All PHMA would be excluded from new ROW authorizations. Only new linear ROW would be allowed in designated ROW corridors. The potential impacts on wildlife that occupy PHMA would be decreased because of the exclusion of ROWs. In PHMA, there would be a decreased probability of habitat degradation and fragmentation. However, because ROWs cannot be placed in the PHMA, more lengthy ROW routes may be necessary to go around closed areas. Longer routes could have more negative effects on wildlife species using habitat outside of PHMA because the ROW would be located in PHMA adjacent habitats, non-federal lands, or private lands.

Renewable Energy Management

Under Alternative 3, PHMA in all states would be ROW exclusion areas for wind and solar energy development. Prohibiting wind energy development would eliminate the likelihood for habitat loss, degradation, fragmentation, direct mortality to birds and bats and direct disturbance to wildlife in PHMA. Alternative 3 would offer more protection from renewable energy development compared to Alternatives 1 and 2 because more areas would be excluded from renewable energy development with no exceptions. Impacts from wind and solar projects are described under *Nature and Types of Effects*.

Mitigation and Adaptive Management

Impacts on wildlife species from mitigation would be similar as described for Alternative 1, because the BLM would require and ensure mitigation that achieves a net conservation gain in all HMA types. These requirements would reduce the potential for impacts from land use activities, such as habitat loss or alterations. Maintaining habitat function and value would benefit wildlife species associated with sagebrush habitats.

Application of Habitat Objectives

Impacts from habitat objectives would be similar to those described for Alternative 1. Since the habitat objectives would be modified under this alternative, the species affected may vary slightly.

Livestock Grazing Management

Alternative 3 would make all PHMA unavailable for livestock grazing and therefore would have the fewest direct impacts on terrestrial wildlife. The reduction in herbivory from livestock grazing under this alternative would allow for herbaceous forage and cover for wildlife to increase and would prevent impacts as described under *Nature and Type of Effects*. There would also be less trampling or compacting of vegetation and/or soils, and less competition for forage, water, space, and habitat alteration.

In contrast, livestock grazing may reduce invasive species and noxious weeds or enhance forage and brood-rearing conditions for some wildlife species, so the removal of livestock grazing may increase the risk of invasion of noxious or invasive weeds. Relatedly, without a reduction in fine fuels, there may be an increased risk of large-scale wildfire that would remove wildlife habitat. Additionally, more fencing may be needed to separate PHMA from adjacent non-federal grazed lands, which could increase collision risk, change or prevent movements by some wildlife species, and increase predator perching opportunities for some species.

Wild Horse and Burro Management

Under Alternative 3, wild horses and burros would be removed from herd management areas within PHMA. This would increase habitat quality for wildlife because there would be a reduction in grazing competition, which could result in improvements to vegetation cover, forb abundance, forage for native wildlife, and spring habitat. Where range improvements, such as water troughs are removed, there would be a reduction in potential drowning hazards and/or potential for disease transmission. Additional fencing may also be needed to keep wild horses off BLM-administered HMAs which could increase collision risk, change or prevent movements by some wildlife species, and increase predator perching opportunities for some species.

ACEC Designation

Under Alternative 3, all ACECs would be managed as PHMA. The management in ACECs under this alternative would be similar to management in PHMA, with the exception of ROW management and locatable minerals requirements. Managing ACECs as exclusion to ROWs both within and outside of designated corridors would expand protections to fish and wildlife from ROW development compared to PHMA. Plans of operations for locatable mineral disturbances would reduce effects if measures were included to reduce disturbance, which would incidentally benefit fish and wildlife in these areas.

10.5.5 Alternative 4

Habitat Management Area Designation

Under Alternative 4, PHMA boundaries would be expanded compared with Alternatives 1 and 2 and acres managed as GHMA would decrease (**Table 2-3**). By managing these areas, wildlife species whose range overlaps with GRSG would benefit from management actions to protect GRSG to a greater extent where PHMA and other HMA designations have expanded. Under this alternative, impacts on wildlife would be similar under to those described under alternatives 1 and 2 with a focus on improving GRSG habitat by increasing acres and conditions of vegetation communities, habitat connectivity, mitigation of noxious weeds and/or invasive species, and decrease conifer encroachment.

Minerals Management

Range wide, leasing would be permitted in HMAs, which would increase potential impacts to wildlife in these areas as described in the *Nature and Types of Effects*. The BLM would, however, implement management strategies that would reduce the possibility of conflict and associated consequences from potential development in GRSG habitats or linking regions as described in **Section 4.2.3**. Giving preference to lands that would not obstruct the suitability and proper operation of GRSG habitat, considering their proximity to already-existing development, potential for development, and the presence of significant GRSG habitats or connectivity areas, would minimize potential impacts to wildlife species that overlap GRSG habitat. In contrast, this may shift operations to nonfederal lands and impact other wildlife species whose range does not overlap GRSG.

The fluid mineral development and leasing objective would consider leasing in areas where there is the least potential for conflicts with GRSG and its habitat. The avoidance strategy will ensure minimal disturbance on wildlife species that overlap GRSG range. However, impacts may be shifted to non-federal lands which may pose greater impacts for wildlife species that do not overlap with GRSG habitat. Those impacts are discussed under *Nature and Types of Effects*.

Other impacts from minerals management would be similar to those described for Alternative 1.

Lands and Realty

Under Alternative 4, in all states managing PHMA (IHMA in ID) as ROW avoidance areas would be similar to Alternative 1. In areas where development cannot be avoided, there would be additional protection by avoiding important GRSG habitat such as leks and nesting/early brood-rearing habitat. This would reduce impacts on wildlife species who also utilize high value GRSG habitat, however, this may shift impacts to other potentially important wildlife habitat that doesn't overlap with GRSG. Impacts on wildlife species are described in *Nature and Types of Effects*.

GHMA would also be managed as ROW avoidance areas within breeding and nesting habitats, along with other limited seasonal use habitats. Avoiding placement of ROWs within one-half mile of PHMA or IHMA would help protect or buffer those areas from indirect impacts. Because all other areas would be managed as ROW open, impacts, such as habitat alteration and disturbance, could occur, however, compensation would be required (see Alternatives). Similar to impacts from PHMA management described above, potential for impacts on wildlife whose range overlaps with GRSG habitats would be reduced, while other wildlife species whose range is outside of GRSG habitat may have increased potential for impacts. Those impacts are described in *Nature and Types of Effects*.

Since HMAs would be extended to additional regions based on best available science, restrictions inside HMAs would lessen impacts on wildlife species whose range overlaps with GRSG, as discussed under *Nature and Types of Effects*. Alternative 4 would have restrictions on disturbance caps between states that would decrease surface disturbances impacting wildlife habitat and improve protection for GRSG habitat within new HMA boundaries.

Renewable Energy Management

Under Alternative 4, wind and solar development would be managed by HMA, and proximity to lek locations, similar to Alternative 3. Management stipulations for PHMA would be exclusion for utility scale wind and solar development. For IHMA exclusion would be within 3.1 miles of active lek locations and avoidance strategies for the remainder. All GHMA would be managed as avoidance. Within the exclusion areas impacts on wildlife that overlap GRSG habitat would be reduced as development would not be permitted. As a result, development would likely shift to areas outside of GRSG habitat, causing direct impacts on wildlife species whose range does not overlap with GRSG. Those impacts are described under *Nature and Types of Effects*.

Mitigation and Adaptive Management

Impacts under this alternative would likely be higher than Alternative 3 because more projects would take place if PHMA, IHMA, and GHMA were not closed to new projects. There would also be the addition of required compensatory mitigation that would meet the requirements set by the state wildlife agency or appropriate authority (See alternatives). Depending on GRSG population triggers there may be additional mitigation in some areas, and the BLM would coordinate with state wildlife management agencies to consider project activities, direct and indirect impacts, and restoration success rate. Impacts on wildlife would potentially be minimized depending on GRSG population triggers in the area and the overlap of wildlife habitat with GRSG habitat. On the contrary, management actions may be shifted to non-federal lands or other wildlife habitat where development and disturbance may occur. These impacts are discussed under *Nature and Types of Effects*.

Application of Habitat Objectives

Impacts on wildlife from application of habitat objectives under this alternative would be the same as Alternative 3.

Livestock Grazing Management

Impacts on wildlife would be similar to those described under Alternative 1. However, because SFAs would not be managed, Alternative 4 does not include a programmatic prioritization strategy. However, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value. In addition, the BLM would include additional management objectives and actions that give GRSG and GRSG habitat further protection from livestock grazing impacts. Some of these management objectives and actions include site-specific adjustments to AUMs, flexibility to adjust permits, and meeting land health conditions. These added management objectives and actions would potentially reduce impacts to other wildlife species that overlap GRSG range. The impacts are further discussed under *Nature and Types of Effects*.

Wild Horse and Burro Management

Impacts on wildlife from wild horse and burro management would be the same as described for Alternative 1.

ACEC Designation

Alternative 4 does not include management for ACECs and thus there would be no effects on fish and wildlife from ACEC management under this alternative.

10.5.6 Alternative 5

Impacts on fish and wildlife from fluid, saleable, nonenergy leasable, and locatable minerals management would be the same as described for Alternative 2. Impacts from application of habitat objectives and minimizing threats from predation would be the same as described for Alternative 3. Impacts from the fluid mineral development and leasing objectives, mitigation, adaptive management, and grazing would be the same as described for Alternative 4.

Habitat Management Area Designation

Under Alternative 5, the BLM would manage protections in more PHMA and less GHMA compared with Alternatives 1 and 2. This would lead to increased protection for other wildlife whose ranges overlap with PHMA but less protection for those whose ranges overlap with GHMA.

Lands and Realty

Impacts under this alternative would be similar to those described under Alternative 4 in comparison to the management of PHMA and IHMA in ID as ROW avoidance areas with the application of minimization measures in areas where major ROWs cannot be avoided.

Renewable Energy Management

Under this alternative, PHMA and IHMA would be classified as avoidance areas. This would minimize the potential impacts from wind and solar development, but to a lesser degree than exclusion areas because development would be considered on a case-by-case basis, whereas development would be prohibited in exclusion areas. Impacts from wind and solar development are described under *Nature and Types of Effects.*

In high value GRSG habitat such as leks and nesting/early brood-rearing habitat, development would not be permitted, therefore impacts to other wildlife species in these areas would be negligible unless certain criteria are met (nonhabitat/unsuitable habitat or the project prevents indirect impacts).

Managing GHMAs as open to wind and solar energy development range wide would result in potential for impacts on wildlife species as described in *Nature and Types of Effects*. However, the inclusion of minimization measures and compensation to maintain GRSG habitats consistent with state agency habitat designations (e.g., restoration, connectivity, seasonal, or other), and to preclude negative impacts to any adjacent PHMA habitats would reduce the potential for those impacts on wildlife in high value and seasonal GRSG habitats.

Under this alternative, a 3% disturbance cap would be applied range wide at the fine scale, similar to Alternative 4, however, there would be a 5% disturbance cap for the project scale in MT and WY (which would include fire, agriculture, and urban development (MT only)). Impacts on wildlife species under this alternative would be similar as described under Alternative 4 but with more exceptions which would potentially result in more development and disturbance in GRSG habitat.

Livestock Grazing Management

Impacts from livestock grazing management under Alternative 5 would be the same as those described for Alternative 4.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be the same as those described for Alternative 1.

10.5.7 Alternative 6

Impacts would be the same as described for Alternative 5 but with the additional designation of ACECs. Under this alternative, ACECs would be open to fluid mineral leasing with NSO stipulations. These stipulations would minimize impacts on wildlife in these areas, however, this would increase the HMA acres that are potentially at risk to effects from mineral development that are discussed in *Nature and Types of Effects*. While limiting surface disturbance would ensure habitat connectivity between lek locations, this would benefit other wildlife that utilize sagebrush habitat in these areas. On the contrary, this may push surface disturbance into other important wildlife habitats that do not overlap with GRSG habitat.

Managing ACECs and saleable mineral/mineral material operations as closed to new or expansion of nonenergy minerals associated with existing operations (e.g., fringe leases) would reduce potential impacts on wildlife species and habitat. Management of these resources would reduce potential impacts on wildlife and habitat such as disturbance and habitat degradation or alteration which is discussed in *Nature and Types of Effects*. However, saleable mineral/mineral material operations would not close all free-use pits and would have more impacts than if not permitted.

Management of ACECs as exclusion areas for major ROWs and wind and solar development and avoidance areas for minor ROWs would reduce potential impacts on wildlife and associated sagebrush habitat, such as disturbance, habitat alterations, and increased potential for predation, as described under *Nature and Types of Effects.* While ROWs would not be permitted in exclusion areas, they would be evaluated on a case-by-case basis in avoidance areas, therefore impacts would be reduced to a greater extent in exclusion areas compared to avoidance areas.

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.

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.

In general, impacts on special status fish and wildlife species would be similar to those discussed under **Section 10.5**, Fish and Wildlife, and **Section 10.2**, Greater Sage-Grouse, while impacts on special status plant species would be similar to those discussed under **Section 10.3**, Vegetation. However, impacts on special status species may be greater than impacts on common species because population viability is already uncertain for special status species. A detailed analysis of impacts on federally listed and proposed species and designated and proposed critical habitat will be prepared in the biological assessment for this RMPA/EIS. The biological assessment is under development and will be included with the Final RMPA/EIS.

Those species more closely associated with sagebrush communities or whose ranges are largely coincident with PHMA and GHMA (e.g., Brewer's sparrow and to a lesser extent white-tailed prairie dog, black-footed ferret, pygmy rabbit, western burrowing owl, ferruginous hawk, Holmgren lupine, Beatley's buckwheat, and squalid milkvetch) would benefit from conservation measures designed to protect GRSG and sagebrush habitat.

Conversely, excluding or avoiding development in GRSG habitats most likely outside of PHMA and IHMA, in GHMA inclusions, may lead to increased activity in other vegetation types (e.g., pinyon-juniper, mountain shrub, and aspen/spruce/fir). Special status species associated with these habitat types, such as pinyon jay, northern goshawk, BLM-sensitive bat species, Canada lynx, Columbian sharp-tailed grouse, sand cholla, Reese River phacelia, and Eastwood milkweed, may be adversely influenced to varying degrees, depending on alternative and development scenarios.

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.

10.7.2 Alternative 1

Alternative 1 would require a 3% disturbance cap on human surface-disturbing activities in PHMA. It would incorporate RDFs consistent with applicable law in PHMA, GHMA, and IHMA and would also require all human disturbances to result in a net conservation gain for GRSG and their habitat. Lek buffers would also be required.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, could exclude infrastructure placement in the most cost-effective locations, and would result in overall greater development costs. A corresponding effect could be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA.

Protections afforded to GRSG and their PHMA or GHMA habitats would benefit wild horses and burros where herd management areas overlap these areas. This is because habitat conditions and forage would be improved, there would be less impact from human disturbances, and wildfire would be strategically managed in habitats. Temporary or long-term management changes to wild horses and burros may be necessary to achieve and maintain the desired habitat condition. Examples are reducing AMLs, designations, removals, movement patterns, and forage access. Alternative 1 would require more intensive management, particularly in the boundaries of SFAs.

10.7.3 Alternative 2

Alternative 2 would remove references to management within SFAs in some states and remove reference to GHMA in Utah. Management is more restrictive on lands within SFAs to emphasize protection of GRSG, management for SFAs provides the highest level of protection to forage. Without these protections, there could be additional surface disturbance, and thus removal of forage Removal of SFAs would increase impacts on wild horses and burros when compared with Alternative 1. Impacts on wild horses and burros, herd management areas, and AML under Alternative 2 within PHMAs would be the same as those described under Alternative 1.

10.7.4 Alternative 3

Under Alternative 3, no new designation of herd management areas would occur in any herd areas that overlap with PHMA unless the area outside of the PHMA boundary could still support a herd management area. All wild horses and burros would be removed from existing PHMA and proposed ACECs, which would result in short-term disturbance of herds by human presence and round up activities. Round ups would occur based on congressional budget appropriations for these actions, therefore the exact timeline is unknown. In the long-term, all wild horses and burros would be removed from PHMA and moved to holding

facilities per wild horse and burro herd-removal guidelines under Public Law 92-195 as amended and 43 CFR Part 4700. Herd management areas in PHMA under Alternative 3 are shown in **Figure 2.80**.

Wild horses and burros outside of herd management areas in PHMA but in adjacent lands could be impacted by changes in management within the herd management area. Because herd management areas would no longer be managed for AML under this alternative, there is potential for removal of resources, primarily water developments. Under Alternative 3, livestock grazing would become unavailable within PHMA, and thus range and water improvements may be removed or reclaimed, which would decrease the availability of developed water sources.

10.7.5 Alternative 4

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. Removal of SFAs could increase impacts to wild horses and burros as forage will not be protected from surface disturbing activities. Management to the low end of the AMLs could reduce wild horse and burro populations in some areas.

10.7.6 Alternative 5

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1.

10.7.7 Alternative 6

Under Alternative 6, the BLM would additionally manage ACECs. These ACEC would cover the same areas as under Alternative 3, however management would include restrictions on fluid minerals, nonenergy minerals, major ROWs, wind, and solar projects. ACEC management would provide further protection to forage for wild horses and burros from surface disturbing activities outside of the HMA.

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 6, 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.

10.8.2 Alternative 1

Greater Sage-Grouse Management

Alternative 1 could directly impact livestock grazing through its requirement through the BLM's management to meet GRSG-specific habitat objectives in PHMA, GHMA, and other HMAs, as well as other actions to achieve desired GRSG habitat conditions. In addition to restricting management in GRSG habitat management areas and including livestock grazing-specific actions in GRSG habitat (prioritizing reviews), the BLM would manage SFAs, which provide additional restrictions on development and disturbance.

These management actions, designed to enhance GRSG habitat on BLM-administered lands, could affect livestock grazing by the following:

Modifying grazing strategies or rotation schedules
Changing duration and the season of use
Changing the kind or class of livestock
Reducing livestock numbers
Reducing AUMs

Management to achieve these desired conditions would also impact permittees by increasing the amount of time permittees spend to manage livestock on BLM-administered lands and the total costs to a livestock operation. Restricting development in SFA would reduce disturbance on livestock and their forage.

Implementing management direction to achieve desired conditions in GRSG seasonal habitat could impact livestock grazing in the long term. It would do this by implementing management that improves rangeland conditions. Improved rangeland condition could also contribute to increased forage production.

Minerals Management

During the planning initiative that culminated in the 2015 RMP decisions, carried forward here as Alternative 1, SFAs were recommended for withdrawal from location and entry under the Mining Law of 1872, subject to valid existing rights. The BLM applied for a withdrawal of the recommended area and the Secretary accepted the application. The Secretary initiated a separate withdrawal process in 2015 pursuant to Section 204 of FLPMA. That process is currently underway. If the Secretary were to withdraw the lands identified in the proposed withdrawal, any resulting reduction in locatable mineral development would reduce impacts on livestock grazing through protection of forage from surface disturbance and a reduction in harassment of livestock from disturbance; the greatest reduction would be in allotments in SFA.

Under Alternative 1, PHMA would be closed to new mineral materials sales, but GHMA would be open. While these restrictions would limit livestock and forage disturbance, they could push development to allotments outside of PHMA. PHMA would be managed as closed to new nonenergy leasable mineral leasing, and impacts would be similar to those described above.

Alternative 1 would prioritize development of fluid minerals outside PHMA, GHMA, and IHMA. This approach would reduce disturbance to livestock and would maintain forage condition in allotments that fall in GRSG occupied habitat. Implementing the GRSG disturbance cap, mitigation strategy, monitoring framework, and hard trigger adaptive management responses under Alternative 1 would ensure that this reduction in disturbance of livestock, while forage condition would be maintained.

SFA would be managed as NSO without waivers, exceptions, or modifications. Unleased fluid mineral actions would be subject to objectives and screening criteria in GRSG habitat. This approach would not increase disturbance to livestock and forage in allotments that fall in GRSG-occupied habitat, but it would result in the fewest reductions in permitted use and the fewest restrictions on range improvement construction. This approach would also result in fewer reductions in permitted livestock use.

Renewable Energy Management

Increased restrictions on renewable energy development under Alternative 1 would reduce impacts on forage and harassment of livestock. Alternative 1 would designate PHMA and SFA as ROW exclusion for utility-scale commercial wind and solar energy facilities. There would be fewer potential reductions in permitted livestock use due to forage destruction and quality reduction. Fewer acres would be subject to restrictions on range improvement construction.

Management direction prohibiting solar and wind development in PHMA and restricting development in GHMA and IHMA would limit any impacts of ground disturbances from developing these resources. This management direction would limit the direct impacts of development and surface disturbances on rangelands, which would be beneficial to livestock grazing. This may shift impacts in areas outside of priority and general GRSG habitats.

Lands and Realty Management

Under Alternative 1, ROW development would be limited in avoidance and exclusion areas within PHMA. This would maintain forage sustainability and would not increase disturbance to livestock. Most of GHMA would remain open to ROW development. ROW development and associated disturbance to livestock and their forage are likely to be concentrated in designated corridors and GHMA. Implementing the GRSG mitigation strategy, monitoring framework, and hard trigger adaptive management responses under Alternative 1 would maintain livestock forage.

Alternative 1 would retain all public lands in public ownership; therefore, there would be no effect on current grazing operations. Limits on human disturbance, mitigation strategy, lek buffers, and other conservation measures would further limit disturbance. This would result in reduced indirect impacts on livestock and their forage in PHMA.

As described above, Alternative 1 would include a cap on human disturbance; the 3% disturbance cap (5% in MT and WY) on discrete human disturbances would be applied in PHMA. Human disturbances in PHMA, GHMA, and IHMA would be mitigated to ensure a net conservation gain to GRSG. Conservation measures would be implemented, such as adaptive management and defined monitoring protocols (**Appendix 2**).

Livestock Grazing Management

Under Alternative 1, the effect of livestock grazing management could increase the management actions necessary to maintain GRSG objectives in PHMA, GHMA, and IHMA.

Impacts could include modifying grazing strategies or rotation schedules, changing the season of use, changing the kind and class of livestock, deferring grazing use until a set objective is met, or reducing livestock numbers. Implementing this management direction could reduce AUMs on some allotments and present challenges to livestock operation viability.

Impacts from modification of grazing strategies could result in a decline in permitted grazing, anticipated over time as permits are modified to meet objectives. Under the Alternative 1, priority for land health assessment and permit renewal on BLM-administered lands would be tiered to include SFA first, followed by PHMA outside the SFA. Existing permits and leases in these areas not meeting Land Health Standards would be given priority, with a specific focus on those containing riparian areas, including wet meadows. The timeline for changes in management would generally follow this priority. In the long term, this prioritization could improve rangeland conditions for livestock and wildlife by focusing management on PHMA that are in most need of improvement.

In GHMA and PHMA, the potential risk to GRSG and its habitats from existing structural range improvements will be evaluated, and modifications of those structural range improvements identified as posing a risk will be addressed. Supplements and supplemental feeding will continue to be authorized where appropriate. New range improvement projects would be designed to monitor, adjust, and limit impacts from new and existing water and structural range improvements, as well as fences. Existing range improvements would be evaluated to make sure they conserve, enhance, or restore GRSG habitat. Consideration of GRSG habitat needs would likely limit the number and types of constructed range improvements. In some instances, improvements may be removed to help attain GRSG habitat objectives.

Under Alternative 1, all or portions of 15 key RNAs would be unavailable to grazing. In those areas, permittees and lessees would need to locate alternative forage or reduce AUMs, with the potential for economic impacts.

Modifications to grazing systems could be required to meet seasonal habitat objectives, increasing costs to lessees and permittees. Acres within nesting habitat may be more likely to require changes to grazing management, due to the desired conditions for this habitat type. Impacts would occur on an allotment scale as permit renewal and related management changes were implemented. The level and intensity of impacts would vary on a site-specific basis.

Under Alternative 1, the BLM may determine if voluntarily relinquished grazing permits and leases and associated allotments should remain available for livestock grazing or be used for other resource management objectives, in accordance with WO IM 2013-184. This may result in some reduction of overall available AUMs, but relinquishment is likely to remain uncommon.

Wild Horse and Burro Management

Management to adjust or reduce AMLs would enhance vegetation productivity and sustainable forage, particularly where rangeland conditions could be improved. Tiered prioritization of gathers in HMAs in SFA, followed by PHMA, GHMA, and IHMA to meet established AMLs would reduce any current levels of forage competition between wild horses and burros and livestock on allotments in PHMA.

10.8.3 Alternative 2

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Impacts from designating GRSG habitat as SFAs, PHMA, IHMAs, and GHMA (**Table 2-3**) would be similar to those described for Alternative 1.

State-Specific Environmental Consequences

SFAs would be removed in UT, WY, NV/CA, and ID, thereby reducing restrictions due to GRSG habitat protection on livestock grazing operations in those areas. Removing SFAs would also prevent restrictions on land use and surface disturbing activities, and the impacts on livestock grazing from those surface disturbing activities would be as described under *Nature and Type of Impacts*. Removing restrictions on SFAs would likely result in fewer impacts on livestock grazing operations when compared with Alternative 1. Protections afforded to forage from restrictions to land use and surface-disturbing activities would continue in SFAs in MT and OR, where the habitat classification would be retained; impacts would be as described under Alternative 1.

Under Alternative 2, the GHMA designation in UT would be removed with all corresponding management actions from the 2015 plan amendments. Removal of GHMA and their associated management actions would likely lead to development in areas formally identified as GHMA and could therefore lead to removal of forage and increased human-livestock conflicts, which would increase impacts on livestock grazing operations when compared with Alternative 1.

Requirements for mitigation that achieves a net conservation gain in all HMA types would apply in MT/ND, NV/CA, and OR, and impacts would be the same as described for Alternative 1. CO and ID would enforce mitigation resulting in no net loss in HMAs. In UT, there would be a requirement to minimize or eliminate threats affecting the status of GRSG or to improve the condition of GRSG habitat. These requirements would help reduce impacts on livestock grazing associated with land use and surface disturbing activities but to a lesser extent than Alternative 1, in which a net conservation gain would be required. In WY, the net conservation gain requirement would be removed, which would increase potential for impacts.

The BLM would not require compensatory mitigation in HMAs, but it would enforce state mitigation policies and programs in CA, CO, ID, OR, UT, and WY. Compensatory mitigation would be voluntary unless required by laws other than FLPMA or by the state. As a result, the potential for impacts from land use activities would increase relative to Alternative 1, in which a net conservation gain would be required.

Impacts from applying a 3% disturbance cap in CO, ID, NV/CA, OR, UT, and the Dakotas or a 5% disturbance cap in MT and WY in PHMA would be like those described for Alternative 1. In UT and ID, the 3% disturbance cap could be exceeded if it would benefit GRSG. The cap would be applied at the BSU and project scale, except in ID which would only apply it at the BSU scale. Some additional development could occur in ID, which may increase potential for forage loss. The ability to exceed the disturbance and density caps could result in loss and degradation of livestock forage and increased human-livestock conflicts. Surface disturbing projects that would be precluded under if no exceedances were allowed could proceed under Alternative 2; however, exceedances to the caps would only be allowed if site-level analysis indicates the project, in combination with all voluntary and required design features, will improve the condition of GRSG habitat, thus likely improving forage conditions.

Minerals Management

Rangewide Environmental Consequences

Impacts on livestock grazing operations from fluid mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in CO PHMA and CO GHMA (see *State-Specific Environmental Consequences*, below).

Impacts from saleable mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in ID IHMAs and NV/CA PHMA (see *State-Specific Environmental Consequences*, below).

Impacts from nonenergy mineral management in PHMA and GHMA would be the same as described for Alternative 1, except in NV/CA PHMA (see *State-Specific Environmental Consequences*, below).

Removing the recommendation for withdrawal of the SFAs in all states (except in MT and Dakotas, which did not have a 2019 amendment) from location and entry under the Mining Law of 1872 would have no impact. This is because recommendations for withdrawal do not restrict any activities; therefore, such recommendations have no impact. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

State-Specific Environmental Consequences

Removing the closure of CO PHMA to fluid mineral development would increase potential for surface disturbance, forage loss, and human-livestock conflicts. This is because mineral development activities could occur in previously closed areas. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts to livestock grazing operations because the NSO stipulation would avoid potential for surface disturbance and forage loss or degradation.

Impacts from prioritizing fluid mineral leasing outside of HMAs in CO, ID, OR, and MT/Dakotas would result in the same impacts in these states as described under Alternative 1. Removing the objective in UT, NV/CA would increase the potential for impacts because land in PHMA and GHMA could be leased. In WY, fluid mineral leasing would be allowed in PHMA, which would increase the potential for impacts. If the BLM has a backlog of interest for leasing, the BLM would prioritize work first in non-habitat followed by lower-tier habitat management areas (e.g., GHMA).

Adding an exception criterion to saleable and nonenergy mineral closures for NV/CA PHMA and allowing consideration of new free use permits for saleable minerals in ID IHMA would increase the potential for associated impacts on livestock grazing operations. This is because there would be a greater chance for saleable and/or nonenergy mineral activities to occur in these areas.

Lands and Realty Management

Rangewide Environmental Consequences

Impacts from ROW management would be the same as described for Alternative 1, with additional exception criteria in NV/CA.

State-Specific Environmental Consequences

There would be additional exception criteria for ROW development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from renewable energy management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA).

State-Specific Environmental Consequences

There would be additional exception criteria for ROW and wind/solar development in NV/CA PHMA and for wind development in NV/CA GHMA. This could increase the potential for impacts associated with ROW and renewable energy development because there would be a higher chance of development and surface disturbance.

Livestock Grazing Management

Rangewide Environmental Consequences

Impacts from domestic livestock grazing management would be the same as described for Alternative 1, except for in the states described below.

State-Specific Environmental Consequences

In UT, WY, and NV, the prioritization for review and processing of grazing permits was removed. The BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

The additional clarification of habitat objectives to land health standards in WY, ID, and NV/CA and clarifications on grazing in riparian areas and management of range improvements in WY may lead to a loss of AUMs in some cases, prohibitions or limitations on range improvements and water developments. Over the long-term movement towards desired conditions under land health standards could improve overall forage conditions.

Wild Horses and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1.

10.8.4 Alternative 3

Livestock Grazing Management

Under Alternative 3, all PHMA and proposed ACECs (see **Table 2-3**) would be made unavailable to livestock grazing. To make grazing unavailable, the BLM may have to construct and maintain a large amount of fencing, particularly in areas with mixed surface ownership, to effectively make grazing unavailable. 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 (see **Section 4.12**).

The requirement to remove livestock grazing in PHMA would result in direct and indirect economic impacts on individuals, companies, and the local community. Most ranches are dependent seasonally on forage on public lands, and some are dependent year-round. Eliminating AUMs on public lands would affect the entire ranching operation by reducing the total amount of available forage Without the opportunity to graze public lands, ranchers would be incentivized to sell their private lands leading to an increased potential for urbanization in some areas, leading to a loss of forage for both livestock and native grazers, and would remove the opportunity to graze livestock in the future, should management decisions change in subsequent resource management and land use plans.

Removal of grazing also means less landscape-scale removal of fine fuels. Eliminating livestock grazing may increase the potential for large and severe wildfires as fuel loads increased in the absence of managed grazing. There would be potential for the BLM to conduct targeted grazing as a means to reduce fine fuels but would not be near the scale that currently exists.

Where areas are made unavailable for grazing due to a permit or lease is being relinquished, the agency may have to compensate the permittee or lessee for the range improvement projects constructed under a range improvement permit or cooperative agreement, in accordance with 43 CFR Part 4120.3-6(c).

Wild Horses and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1.

10.8.5 Alternative 4

Greater Sage-Grouse Management

Impacts on livestock grazing operations from designating GRSG habitat as HMAs (**Table 2-3**) would be similar to those described for Alternative 1. Impacts from applying a 3% disturbance cap at the project scale would be similar as to those described for Alternative 2, however, the disturbance cap would apply to both existing and proposed infrastructure authorizations, subject to valid existing rights, while wildfire and agriculture would not be included in the disturbance cap calculation. The level of disturbance from other sources such as energy development, roads and ROWs, and other surface disturbing activities would be higher than if wildfire and agriculture were included in the disturbance calculation. The disturbance cap could be exceeded at the project scale under certain conditions, which may lead to more development and increased impacts on livestock grazing operations, forage, and increased human-livestock conflicts. There would be no exceptions to the 3% PHMA (and IHMA) disturbance cap at the HAF fine scale habitat selection area, which would limit removal of forage or disturbance livestock at this scale.

Minerals Management

Increasing the acres subject to NSO Alternative 4 compared with Alternative 1 would reduce the HMA acres affected and potential for impacts. Prioritizing projects that avoid, minimize, reduce, rectify, and/or adequately mitigate for direct and indirect impacts to PHMA/IHMAs and including applicable and technical COAs would also reduce impacts on livestock grazing operations and forage.

Lands and Realty Management

Impacts on livestock grazing from managing PHMA in all states and ID IHMAs as ROW avoidance areas would be like those described for Alternative 1. Where development cannot be avoided, additional protection would arise unless certain criteria are met (see **Chapter 2**). This would reduce the potential for impacts.

Managing GHMA as ROW avoidance areas within limited GRSG habitats to meet the RMP GRSG goals and habitat objective would reduce the potential for impacts on forage. Within ROW avoidance areas in GHMA, the potential for livestock grazing operations and forage to be affected may vary depending on the location. Avoiding placement of ROWs within one-half mile of PHMA or IHMA would protect those areas from impacts. All other areas would be managed as ROW open, so impacts, such as surface disturbance or forage removal could cause a reduction in AUMs, thus reducing the amount of forage available for grazing.

Renewable Energy Management

Rangewide Environmental Consequences

Impacts from managing PHMA in all states as ROW exclusion areas for wind and solar energy development would be similar to those described for Alternative 2. Since PHMA would apply to a smaller area under this alternative, the extent of reduction in impacts on livestock grazing from disturbance associated with from renewable energy development would be less.

Managing GHMA as avoidance areas for wind and solar energy development in all states would decrease the potential for impacts associated with wind and/or solar development but to a lesser extent than exclusion areas. Where avoidance is not possible, impacts to livestock grazing and forage would be minimized through certain measures such as avoiding surface use and occupancy. Such measures would protect PHMA and the forage within from indirect impacts.

State-Specific Environmental Consequences

Managing ID IHMAs as exclusion areas for wind and solar energy development within 3.1 miles from active leks and avoidance in the remainder of the IHMA would decrease the potential for impacts on livestock grazing and forage as described in Nature and Types of Effects, but to a lesser extent than if the entire IHMA were managed as an exclusion area. This is because solar and wind development would be considered on a case-by-case basis in avoidance areas, whereas it would be prohibited in exclusion areas. As such, there would be greater potential for development to occur in avoidance areas.

Livestock Grazing Management

Because the presence of GRSG HMAs would not affect whether an area is available for livestock grazing (except in Oregon key RNAs) and existing areas designated would be maintained as available or unavailable for livestock grazing, impacts from livestock grazing management would be the similar to those described for Alternative 1.

The BLM would include additional livestock grazing management objectives and actions to minimize or reduce impacts to GRSG and habitat. For example, in HMAs, livestock grazing would be managed to toward meeting land health standards the GRSG habitat objectives, avoid direct adverse impacts to key GRSG habitats from range improvements, and employ grazing management strategies that avoid concentrating livestock on key GRSG habitats during key seasons. This could lead to prohibition of range improvement construction as well as adjustments to existing AUMs to meet these management objectives. There would be increased flexibility to adjust the terms and conditions of grazing permits conditions to help avoid or reduce impacts to GRSG or habitat.

Additionally, where the land health standards for GRSG habitat are not met - as indicated by an unsuitable site-scale HAF assessment specific to site capability – and existing livestock grazing is a significant causal factor, adjustments to livestock grazing practices would be made at the authorization, allotment, or activity plan level and in accordance with applicable regulations (43 CFR Part 4180.2(c)(1) or subsequent changes to regulations or policy). Range improvements and other existing infrastructure, such as water developments, would be evaluated with respect to their effect on GRSG and GRSG habitat. These evaluations could lead to limitations on the placement, repair, or construction of range improvements.

Wild Horses and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1. Management of wild horse and burro populations to the low end of the AMLs could reduce forage competition between wild horse and burro populations and livestock in some areas.

10.8.6 Alternatives 5 and 6

Greater Sage-Grouse Management

Rangewide Environmental Consequences

Impacts from applying a 3% disturbance cap would be the same as described for Alternative 4, except in WY and MT (see State-Specific Environmental Consequences). Impacts from exceeding the 3% disturbance cap under certain conditions would be similar to those described for Alternative 4, but more exceptions would be allowed, which may result in increased development, leading to a potential reduction in forage availability.

State-Specific Environmental Consequences

Impacts from applying a 5% disturbance cap at the project scale in WY and MT would be similar to those described for Alternative 1. The 3% disturbance scale would still apply at the HAF fine scale habitat selection area, which may prevent some additional development within those areas, reducing impacts on livestock grazing operations. WY and MT would include wildfire and agriculture in the disturbance calculation, and therefore, the level of disturbance from other human-made surface disturbing activities would be relatively lower than if wildfire and agriculture were not included in the disturbance calculation, similar to Alternative 2.

Minerals Management

Impacts on livestock grazing from mineral resource management would be the same as described for Alternative 4. The exception is in WY and MT, where applying a 5% disturbance cap at the project scale could allow for more potential mineral development, depending on the degree to which wildfire and agriculture contribute to disturbance in a given area, which could increase surface disturbance and forage removal, as well has increased human-livestock conflicts.

Renewable Energy Management

Classifying PHMA and IHMA as avoidance areas for wind and solar energy development would increase the potential for surface disturbing impacts and disturbance to livestock compared with Alternative 1 under which most PHMA would be exclusion areas.

Managing GHMA as open to wind and solar energy development in all states would result in potential for surface disturbing and limitation on livestock grazing availability.

Lands and Realty Management

Impacts from managing PHMA in all states and ID IHMAs as ROW avoidance areas and applying minimization measures where major ROWs cannot be avoided would be similar to those described for Alternative 4.

Compared with Alternative 1, managing GHMA in all states as open to ROW with minimization measures and compensation would increase the potential for ground disturbing impacts and disturbance to livestock. Such management would benefit grazing in the instances where a ROW is needed to access an allotment or where a structural range improvement is desired.

Livestock Grazing Management

Rangewide Environmental Consequences

Impacts from livestock grazing management would be the same as described for Alternative 4.

State-Specific Environmental Consequences

In OR, the 15 key RNAs would be retained; but their associated areas allocated as unavailable to grazing are proposed to be retained, modified, or re-allocated to grazing based on district-generated, site-specific

updated information since the 2015 ARMPA. This would result in an increase in acreage available for grazing in the Black Canyon, Dry Creek Bench, North Ridge Bully Creek, South Ridge Bully Creek, and Spring Mountain Key RNAs (see **Appendix 3**).

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1.

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 transmission lines over 100kv and distribution pipelines over 24" diameter but may also include smaller electrical transmission and/or distribution lines and pipelines, as well as, other ROW projects that require large distances, density or footprints, with high levels of activity or surface disturbance. In addition, major ROW sites may contain multiple types of above and below ground features leading to a high density of infrastructure, or many tall structures. All others are considered minor ROWs (see Glossary).

- Wind speeds for utility scale wind are often placed in areas with average annual wind speeds of 14.5 miles per hour (mph) or higher. However, newer technologies may make it possible to place turbines in areas with wind speeds of 12–14 mph in some circumstances.
- The types of actions that can result in the impacts described below are discussed in more detail in **Section 4.9.1**, Nature and Type of Effects.

Impacts Common to All Alternatives

All action alternatives for each state would increase the restrictions of ROWs in PHMA by applying exclusion and avoidance areas. This would result in adverse effects to lands and realty and renewable energy since it would decrease the acreage available to new development, which could lead to more complex designs, exclude infrastructure placement in cost effective locations, result in overall greater development cost and increased review periods. Such stipulations could limit future access, delay or increase the cost of energy supplies, or delay or restrict communications service availability. ROW exclusion and avoidance areas decrease the amount of land available for new development and could promote collocation. Collocating of new infrastructure within existing ROWs could reduce land use conflicts, additional land disturbances, and demarcate the preferred locations for utilities, which would simplify the processing on BLM-administered lands.

Avoidance areas require ROW applicants to meet additional project criteria, which could influence project location, delay the availability of energy supply (by delaying or restricting pipelines or transmission lines) or delay or restrict communications service availability. Within exclusion areas, new ROW development would be prohibited, which would prevent the lands and realty program from approving new applications in these areas and shifting them to GHMA and nonhabitat areas where fewer restrictions would apply. These restrictions would prevent the BLM from accommodating future demand for ROW development within the decision area.

10.9.2 Alternative 1

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 GRSG. Variations range from blanket restrictions on ROW development in PHMA and GHMA to variable restrictions by industry or project type. Plan details are derived from each state's 2015 ARMPA. **Table 38** in **Appendix 12** provides each state's proposed management of ROWs under Alternative 1 for all ROW types. Wind acres associated with the RFD are in **Appendix 12**, **Table 37** and solar acres associated with the RFD are in **Appendix 9**, **Table 3-10**.

Under Alternative 1, most of the states would manage PHMA and GHMA as ROW avoidance areas. PHMA would be managed as exclusion areas for ROWs including wind and solar major ROWs if the state has sufficient solar potential and differentiates solar ROWs.

Key elements in the planning area include the following:

- All states except North Dakota, South Dakota, and Utah would each have some form of disturbance caps on surface disturbing activities.
- Colorado, Idaho, Southwest Montana, and Utah would have land use authorizations that require avoiding disturbance to any BSU.
- Nevada, Northeastern California, Idaho, Southwest Montana, Utah, and Wyoming would require lek buffers.
- All states except for Colorado and Oregon would have requirements and/or restrictions for power lines.

- In Nevada, Northeastern California, Idaho, Southwest Montana, and Utah ROWs would be allowed if they could be demonstrated to provide a net conservation gain for GRSG habitat. A further description of this is located in **Appendix 2**. Existing GRSG Management.

Additionally, in Oregon, the BLM would manage SFA and PHMA outside of SFA as ROW exclusion areas for wind and solar, with the exception of Lake, Harney, and Malheur Counties. Within the avoidance areas of Lake, Harney, and Malheur Counties, Alternative 1 would establish a hierarchy to development opportunities, beginning with nonhabitat as the first preference, followed by poor quality GRSG habitat before considering high quality GRSG habitat.

Allowing future development in Lake, Harney, and Malheur Counties would accommodate future demand since these areas contain the most developable wind resources in the state. Demand for new transmission lines, access roads, and related ancillary features to serve new wind generation projects in Lake, Harney, and Malheur Counties, GHMA, and in nonhabitat or private lands could result in new ROW applications in PHMA.

In areas where the ROW avoidance and exclusion restrictions listed above would apply the impacts would be as described in the *Nature and Type of Effects*, above. Additionally, restrictions to development on BLM lands might push development onto private land, which could result in indirect impacts as described under *Nature and Types of Effects*.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, potentially excluding infrastructure placement in the most cost-effective or environmentally-suitable locations and potentially resulting in overall greater development costs. Another effect could be a reduction in the number of authorization applications for activities and longer, more complicated review periods for those that are proposed in GRSG habitat. A potential limiting factor for ROWs would be the width increase limit placed on existing ROWs. This limit would not accommodate the width of a fallen transmission line tower.

10.9.3 Alternative 2

Alternative 2 is derived from each region's respective 2019 RMPA/EIS, if completed by the state. Three of the states updated their plans with respect to lands and realty management. Colorado, Idaho, Montana, Oregon, North Dakota, and South Dakota did not provide a new or updated management for lands and realty and thus impacts would be as described under Alternative 1 for these states.

State-Specific Environmental Consequences

In Nevada, Alternative 2 would update the HMA boundaries for PHMA, GHMA, and OHMA to reflect the best available science, and outline a process for periodically revising these boundaries in the future as new data becomes available. Updating the HMA boundaries would result in a relatively minor shift in PHMA (-0.5%) and GHMA (+0.5%); these changes would not result in discernible differences from Alternative 1. The decrease in OHMA (-17%) would have negligible impacts on land use and realty, as there are limited allocation decisions tied to OHMA; therefore, the difference between the nature and types of impacts described would be negligible. These impacts are discussed under Alternative 1.

In Utah, Alternative 2 would remove the GHMA designation for GRSG from the 2015 plan. This would decrease impacts on lands and realty projects by allowing site-specific GRSG habitat analysis and population information, as well as proponent-developed project design elements, to be considered on a project-specific basis. If those voluntary measures were to improve GRSG habitat, both the disturbance and density caps

could be exceeded, allowing for more flexibility to allow consideration of infrastructure projects. There would be an option to exceed the cap by proponents developing measures that improve GRSG habitat. This would provide more opportunities for ROW development within PHMA.

The mitigation strategy for Alternative 2 in Utah would no longer require proponents to provide for compensatory mitigation on a project-by-project basis to show a net conservation gain. While the strategy would be similar, it would be achieved by the totality of GRSG management actions applied by the BLM. Not requiring proponents to pay for vegetation and habitat treatments could decrease project costs, providing more opportunities for ROW development in PHMA; however, during project design, the BLM would consider voluntary compensatory mitigation actions as a component of compliance with the State of Utah law, statute, or policy or when offered voluntarily by a project proponent. If such mitigation were volunteered, impacts would be the same as those described under the No-Action Alternative of the 2019 EIS.

Under Alternative 2 in Utah, changes in MA-SSS-3B[1] that allow site-specific GRSG habitat analysis and population information and project design elements to be considered on a project-specific basis, could potentially lessen impacts on renewable energy as it allows for more flexibility to allow infrastructure projects that exceed the disturbance cap if they meet the described criteria. This would likely have little impact on renewable energy development because PHMA would still be closed to commercial wind and solar development unless the project meets the exception criteria identified in MA-SSS-1.

In Wyoming under Alternative 2, impacts on the lands and realty program as a result of changes to habitat management areas would likely be minor over the landscape, with site-specific impacts potentially occurring where new restrictions are applied in areas that previously did not have restrictions (i.e., new PHMA in what was previously GHMA). This would require some projects to have additional restrictions and others to have fewer restrictions (i.e., projects in areas that transitioned from PHMA to GHMA designations). Depending on the change in acreage, impacts on lands and realty would likely be negligible.

Wind development in PHMA in Wyoming would be managed under the 2014 and 2015 decisions. If additional PHMA were identified in areas that were previously GHMA, then it could become more challenging for wind energy development to occur in those newly identified PHMA due to the restrictions on wind energy development in PHMA. If any areas were identified as GHMA (that were previously PHMA), those areas would then be available and open to wind energy development.

There would be no impact on solar energy development in Wyoming, beyond that identified under Alternative 1.

10.9.4 Alternative 3

Under Alternative 3 all HMAs and proposed ACECs would be managed as PHMA, there would not be GHMA classification and GRSG habitats would not be differentiated. This would result in all habitat being considered and managed as PHMA, and result in the most restrictions to lands and realty of all the alternatives.

Limitations on new ROWs and above-ground linear features, such as transmission lines and pipelines could restrict the availability of energy or service availability and reliability for communication systems. ROW exclusion areas could extend the processing time for renewals of existing ROW authorizations and make

[1] MA-SSS-3B – 2015 ARMPA Decision Number

siting of new linear or block ROWs more difficult. For linear ROWs, avoiding GRSG habitat could lead to the abandonment of the project based on increased costs or the inability to locate the project without using public lands. Costs also would be incurred as a result of requirements for mitigation in areas with limits on surface disturbance.

In some areas, there is a high concentration of intermixed landownership, corridors, oil, gas, and geothermal development, and existing authorizations. In these areas, restrictions on the ability to authorize ROWs and land tenure/landownership adjustments would have a greater impact than in areas with lesser degrees of intermixed ownership, ROW corridors, minerals development, and existing authorizations. The existing network of developed ROWs could provide opportunities for the collocation of compatible authorizations, but these may be limited due to size and availability. If the upgrading can be accommodated within the existing ROW and as long as it does not affect the integrity of, or the ability to operate facilities or their ability to operate their facilities (43 CFR Part 2807.14)

Managing habitat as exclusion areas for utility-scale wind and solar energy ROW development would eliminate LM's ability to accommodate new wind or solar energy demand on that portion of GRSG habitat. This would shift the burden to adjacent non-federal lands that do not have the siting requirements or mitigation standards and could increase costs. ROW exclusions would also inhibit development on adjacent private and state land where transmission infrastructure would be needed across BLM-administered lands. Alternative 3 would restrict the possibility for urban expansion and housing affordability, as well as limit necessary infrastructure development, including that required for emergency services.

10.9.5 Alternative 4

Under Alternative 4, areas within 0.5 miles of PHMA/IHMA would be designated as ROW avoidance areas to address the impacts to adjacent PHMA/IHMA. If these areas are mapped, then the remainder of GHMA that lies outside the 0.5-mile buffer, would be managed as open to major ROWs. If these areas are not mapped, the entire GHMA would be managed as ROW avoidance areas and the habitats would be identified during implementation. Designated corridors would be managed as open to ROWs and all habitats would be subject to mitigation, this would result in a less restrictive planning process for projects. GHMA would be managed as ROW avoidance areas within breeding, nesting, and limited-seasonal habitats. The identification of these habitats would be the responsibility of each state's wildlife agency. This would allow for states to have an additional involvement in the planning process.

Utility scale wind and solar projects in PHMA would be managed as ROW exclusion areas. IHMA would be managed as ROW exclusion areas within 3.1 miles of active leks, outside of the 3.1-mile buffer, and IHMA would be managed as ROW avoidance areas. Areas within 0.5 miles would be managed as ROW avoidance areas to address the indirect impacts to the adjacent PHMA and IHMA. GHMA not included in the 0.5-mile buffer would be managed as ROW avoidance areas for utility scale wind and solar projects. The impacts under Alternative 4 would result in standardized management practices across the project area and would remove State-by-State restrictions. This would allow for easier planning for large interstate projects such as transmission lines and simplify management expectations across the planning area. However, similar to Alternative 3, Alternative 4 could restrict the possibility for urban expansion and housing affordability as well.

10.9.6 Alternative 5

Under Alternative 5, lands encompassing major ROWs and utility scale wind and solar in PHMA would be managed as ROW avoidance areas, while in GHMA they would be managed as open to ROWs. GHMA

would be subject to mitigation measures for both major ROWs and utility scale projects. Designated corridors would remain open to ROW development and mitigation would not be required.

Similar to Alternative 4 the impacts would result in standardized management practices across the planning area. The impacts to ROWs would be less than all other alternatives since the BLM would not designate ROW exclusion areas, mitigation would not be required in corridors, and buffers would not be placed in areas surrounding HMAs.

10.9.7 Alternative 6

Impacts would be the same as Alternative 5. Additionally, management of ACECs as ROW exclusion under Alternative 6 could prevent ROWs from being developed, could increase costs, or could increase development pressure on adjacent lands.

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. The types of actions that can result in these impacts are discussed in more detail in **Section 4.10.1**, Nature and Type of Effects. 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.

Alternative 1

Rangewide Environmental Consequences

All states include language to maintain and enhance sagebrush habitats with the intent of conserving GRSG populations. The exact language varies by state, see the state headings below for more details. This Alternative affirms habitat management area (HMA) boundaries from 2015 amendments (as maintained).

Most states are NSO (in PHMA and IHMA) and/or have seasonal restrictions. Wyoming and Montana are also subject to density and disturbance limits. Colorado closes PHMA within 1 mile of leks to fluid mineral leasing. This Alternative maintains the Sagebrush Focal Areas (SFAs) from the 2015 amendments.

If a state is not specifically mentioned under its own environmental consequences heading, the rangewide consequences would apply.

Colorado Environmental Consequences

Management actions related to lands and realty in conjunction with protection of GRSG and its habitats and use area could adversely impact fluid minerals leasing and development. This potential for impacts includes reduced availability, reduced accessibility, and increased costs.

Reduced availability is the least significant impact from lands and realty actions. This is because the BLM does not require a lands action (Issuance of a ROW grant) for surface occupancy of federal lands to drill into federal minerals. Accessibility to federal minerals with new leases could be significantly reduced or precluded when management of specific areas as ROW exclusion areas would prohibit access roads or pipelines into those areas.

Identification of ROW avoidance areas, while not creating absolute barriers to use of the area for access roads or pipelines, or for locating surface facilities on federal lands for the purpose of accessing private minerals, could make permissible facilities infeasible for technical or economic reasons. Some other potential management actions or BMPs could also affect costs that would make a project infeasible.

Alternative 1 would manage all PHMA and GHMA (**Table 2-3**) as ROW avoidance areas with exceptions for pending large transmission lines. No aboveground structures would be authorized within 1 mile of active

leks. Avoidance areas would require that impacts be avoided. The ROW could be allowed, subject to COAs, all applicable surface use stipulations, and any site-specific stipulations identified through the NEPA process. Potentially large local impacts on access of fluid minerals where the PHMA and GHMA are open for large transmission lines. Areas open to large transmission lines could preclude development of facilities required for access to fluid minerals.

New leasing would be prohibited within 1 mile of all active leks. Potentially large local impacts on access of fluid minerals where the PHMA and GHMA are open for large transmission lines. No modifications or waivers would be permitted, and the BLM Authorized Officer may grant an exception to this NSO stipulation only where the proposed action:

1. Would not have direct, indirect, or cumulative effects on GRSG or its habitat
2. Is proposed to be undertaken as an alternative to a similar action occurring on a nearby parcel, and would provide a clear conservation gain to GRSG

Exceptions based on conservation gain (number 2, above) may only be considered in PHMA of mixed ownership where federal minerals underlie less than 50% of the total surface, or areas of the public lands where the proposed exception is an alternative to an action occurring on a nearby parcel subject to a valid federal fluid mineral lease existing as of the date of this RMP. Exceptions based on conservation gain must also include measures, such as enforceable institutional controls and buffers, sufficient to allow the BLM to conclude that such benefits would endure for the duration of the proposed action's impacts.

Any exceptions to this NSO lease stipulation may be approved by the BLM Authorized Officer only with the concurrence of the State Director. The BLM Authorized Officer may not grant an exception unless the applicable state wildlife agency, the USFWS, and the BLM unanimously find that the proposed action satisfies 1 or 2, above. Such finding would be made initially by a team of one field biologist or other GRSG expert from each respective agency. In the event the initial finding is not unanimous, the finding may be elevated to the appropriate BLM State Director, USFWS State Ecological Services Director, and state wildlife agency head for final resolution. In the event their finding is not unanimous, the exception would not be granted.

Approved exceptions would be made publicly available at least quarterly. Because all of PHMA would be managed as NSO with very rare potential for exceptions, impacts would be increased difficulty of access, increased costs, and decreased efficiency of oil and gas development in PHMA.

The following BMPs have the potential to significantly affect the economic feasibility of individual oil and gas projects. Those with the greatest potential for affecting future developments are the following:

- Place liquid gathering and storage facilities outside PHMA—Potentially cost prohibitive where a well pad would be located several miles from the storage tanks due to the additional piping costs when water or liquid condensates are produced in very small quantities from a natural gas well and more efficiently hauled off-site with trucks. However, because all PHMA would be NSO with limited exceptions under this alternative, very few well pads might be subject to this BMP.
- Place new utility developments in existing utility or road corridors—Potentially cost prohibitive where the road follows a long and topographically complex route, thereby lengthening the utility development and potentially requiring one or more lift stations for liquids.
- Bury electric distribution lines—Potentially cost-prohibitive where a well pad would be located a long distance from the nearest utility tie-in, compared to the cost of constructing an aboveground line fitted with raptor deterrents.

- Limit noise to less than 10 decibels above ambient levels at sunrise at a lek perimeter during the lek season and require noise shields during the lek, brood-rearing, and winter-use seasons—This could increase development costs if it were to require erecting expensive, site-specific, acoustical barriers for wells.
- Locate all new compressors outside PHMA—This could be cost prohibitive or not technically feasible in certain situations, depending on the topography over which gas-gathering pipelines are installed, the pressure of the natural gas at the wellhead, and the location and availability of a permissible compressor in relation to commercial pipelines, access roads, and other utilities.
- Incorporate GRSG habitat requirements in reclamation—This is unlikely to be an issue for well pad reclamation. However, very long road or pipeline corridors could be prohibitively expensive if they require including GRSG components if planting or transplanting sagebrush is required instead of including sagebrush in a seed mix with native perennial bunchgrasses and forbs.

A determination of the extent to which increased costs and decreased efficiency would affect fluid minerals development is a function of project- and site-specific considerations and of market forces at the time. It is possible that some well pads, access roads, pipelines, and other facilities would be affected to the extent that marginal projects are economically nonviable, reducing the number of future oil and gas wells to an extent that may be considered significant at the local, state, or regional levels.

Idaho Environmental Consequences

Impacts from Lands and Realty Management

Under Alternative 1, all PHMA and IHMA would be managed as ROW avoidance areas. All acres in PHMA and IHMA would be either closed to leasing or open subject to NSO stipulations, so no oil and gas activities on future leases within these areas would require new rights-of-way. Therefore, oil and gas activity in PHMA and IHMA would not be impacted by management of ROW avoidance areas under Alternative 1.

All GHMA would be managed as ROW avoidance for high voltage transmission lines and major pipelines but open to other fluid mineral-related ROW location under Alternative 1. Transportation of fluid minerals might be impacted by the major pipeline ROW avoidance but fluid minerals beneath those acres would be unlikely to be significantly impacted by the ROW avoidance area.

Application of RDFs, BMPs, buffers, and seasonal timing restrictions to ROW construction in all GRSG habitat would also limit construction of new ROWs for oil and gas development. If these limitations made it uneconomic to develop a ROW for oil and gas development, development of federal oil and gas resources in the planning area could decrease.

Impacts from Fluid Minerals Management

Under Alternative 1, approximately 257,400 unleased acres with medium development potential (33% of the federal oil and gas estate with medium development potential) would remain closed to oil and gas leasing. Closing unleased lands to leasing, especially those with medium potential, would have the greatest impact on fluid minerals resources in Idaho by prohibiting oil and gas development. Impacts of closing these areas to leasing are the same type as those described under Nature and Type of Effects.

Approximately 348,100 acres, or 44% of unleased federal oil and gas estate with medium development potential (including all areas in PHMA and IHMA not already closed) would be open to oil and gas leasing subject to NSO stipulations. Under this alternative there would be no waivers or modifications to the NSO stipulation, and only one exception would exist. A total of approximately 77% of unleased federal oil and gas

estate with medium oil and gas potential in the decision area would be inaccessible, either due to closure or NSO, under Alternative 1.

Under Alternative 1, approximately 121,900 unleased acres, or 17% of the unleased federal oil and gas estate with medium development potential would be open to oil and gas leasing, subject to lek buffers and TL stipulations. This would include all areas in GHMA not already closed. These stipulations would restrict the timing and location of oil and gas exploration and development activities**.**

Under Alternative 1, it is reasonably foreseeable for planning purposes that 15 new oil and gas exploratory wells would be developed on federal fluid mineral estate in the decision area in the next 20 years.

The BLM could not apply COAs that would eliminate reasonable opportunities to develop an existing lease. Therefore, although restrictions on development would increase where COAs were applied, oil and gas development would still be allowed in these areas.

Geophysical exploration would be allowed on the over 8 million acres of federal mineral estate within PHMA but would be subject to TLs and other restrictions. Geophysical exploration would be allowed only for gathering information about fluid mineral resources outside PHMA. Because of these limitations and the fact that PHMA would be closed to fluid mineral leasing, geophysical exploration in PHMA would decrease under this alternative. Decreases in geophysical exploration in PHMA could impact the fluid minerals program.

Under Alternative 1, RDFs would be applied as COAs to existing leases on PHMA and GHMA overlying federal mineral estate. Only management actions related to master development plans and unitization would apply. Application of the 3% disturbance cap in PHMA and IHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities and new surface development on existing leases could be affected or temporarily delayed if the cap were exceeded. Application of lek buffers in GHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. Applying lek buffer distances when approving actions could also restrict development of infrastructure related to fluid mineral development.

Under Alternative 1, RDFs would be applied as COAs to existing leases on occupied habitat overlying federal mineral estate. These RDFs would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. The BLM could not apply COAs that would eliminate reasonable opportunities to develop the lease. Restrictions and costs on development would increase where COAs were applied, but oil and gas development would still have reasonable opportunity to occur.

Geothermal

Impacts from Fluid Minerals Management

Under Alternative 1, 11,296,800 acres, or 44% of planning areas, would remain closed to geothermal leasing. This includes 2,832,200 acres with moderate to high geothermal potential (32% of the moderate to high geothermal potential acres in the decision area). An additional 8,464,000 acres (34%) with no or low geothermal potential would remain closed to geothermal leasing. Geothermal resource potential may be outdated or inaccurate in some areas and it is possible that developable resources exist in these areas. New technologies such as Enhanced Geothermal Systems (EGS) could make areas considered low or moderate feasible in the future, therefore it is difficult to predict the impacts of closure of low to moderate geothermal potential areas.

13,834,400 acres would be subject to TL and CSU stipulations (including 1,278,100 acres in moderate to high geothermal potential areas) and 9,630,000 acres would be subject to NSO stipulations, including 2,906,800 acres in moderate to high geothermal potential areas.

Under the Alternative 1, RDFs and BMPs would be applied as COAs when a geothermal drilling permit or other post-lease activity is approved. In addition to affecting new leases, the COAs would be applied to the 25,571 acres of existing leases within GRSG habitat, consistent with existing lease terms and special stipulations. These RDFs and proposed management actions would include such requirements as noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards.

The BLM could not apply COAs that would eliminate reasonable opportunities to develop an existing lease. Restrictions on development would increase where COAs were applied, but geothermal development would still be allowed in these areas.

Impacts from Lands and Realty Management

Under Alternative 1, 8,365,000 acres (33%) of BLM-administered surface in the decision area (including all PHMA) would be managed as ROW avoidance areas, where development of new ROWs for geothermal development could not occur unless the Anthropogenic Disturbance Development and Screening Criteria (AD-3 and AD-4) were satisfied. These restrictions would only allow new ROWs to be developed pursuant to a valid existing authorization.

1,013,800 acres (4%) of BLM-administered surface in the decision area (including all IHMA) would be managed as ROW exclusion areas where development of new ROWs for geothermal development could not occur unless the Anthropogenic Disturbance Development Criteria (AD-4) were satisfied (including the requirement that the project would not exceed the 3% disturbance threshold). Lessees would be unable to site off-lease features, such as transmission lines, roads, and pipelines that may be necessary to transport the product to market, on public lands. These actions could result in the stranding of a geothermal lease and its resources, if surrounded by federal lands subject to these constraints.

Application of RDFs, BMPs, buffers, and seasonal timing restrictions to ROW construction in GRSG habitat would also limit the construction of new ROWs for geothermal development to certain times of the year or in certain locations. If these limitations made it uneconomic to develop a ROW for geothermal development, development of federal geothermal resources in the planning area could decrease.

Impacts from Anthropogenic Disturbance Management, Adaptive Management, and Coordination

Under Alternative 1, anthropogenic disturbance, including leasable mineral development, would be limited to 3% of nesting and wintering habitat within PHMA and IHMA within a Conservation Area (BSUs). In BSUs where the 3% cap is already exceeded, new development of federal leasable mineral resources would be prohibited until enough habitat was restored to maintain the area under the threshold. Development of federal leasable mineral resources that would result in exceedance of the 3% cap in a BSU would also be prohibited. Impacts would be greatest where these caps limit development in unleased portions of high geothermal potential because these areas have the highest potential for leasable mineral development. The uncertainty from this limitation could decrease the value of any future lease, disincentivize geothermal energy development in the western United States, and could affect the ultimate scope of rights authorized under any lease offered in the future.

Montana Environmental Consequences

Under Alternative 1, priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMA and GHMA. When analyzing leasing and authorizing development of fluid mineral resources, including geothermal, in PHMA and GHMA, and subject to applicable stipulations for the conservation of GRSG, priority will be given to development in non-habitat areas first and then in the least suitable habitat for GRSG. Where a proposed fluid mineral development project on an existing lease could adversely affect GRSG populations or habitat, the BLM will work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts to the extent compatible with lessees' rights to drill and produce fluid mineral resources.

Alternative 1 would apply an NSO stipulation within all GRSG PHMAs and apply an NSO stipulation within 0.6 miles of GRSG leks in Restoration Areas and GHMAs. Development on existing leases within PHMAs would be subject to density and disturbance limits. CSU stipulations would be applied within RAs in order to maintain GRSG habitat. TL stipulations would be applied from March 1 to June 15 in GRSG nesting habitat within 3 miles of a lek within RAs and GHMAs, and from December 1 to March 1 within designated GRSG winter range within 3 miles of a lek.

In PHMA, this alternative would implement an anthropogenic disturbance cap of 5% at the BSU and project area scale and implement a density cap of an average of 1 energy and mining facility per 640 acres.

Nevada Environmental Consequences

Alternative 1 would require a 3% disturbance cap on human surface-disturbing activities in PHMA and would incorporate RDFs consistent with applicable law in PHMA, GHMA, and OHMA. It requires all human disturbances to result in a net conservation gain for GRSG and their habitat, and lek buffers would be required.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, potentially excluding infrastructure placement in the most cost-effective locations, and potentially resulting in overall greater development costs.

A corresponding effect could be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA. Implementing the GRSG habitat conservation management actions listed above would also place NSO stipulations on fluid mineral development in PHMA, which would further reduce the demand for new ROW development in those areas.

North Dakota Environmental Consequences

Impacts from Lands and Realty

Under Alternative 1, all BLM-administered surface in PHMA (32,900 acres, or approximately 100% of BLM-administered surface in the decision area) would be managed as ROW avoidance areas for oil and gas-related activities. All fluid mineral development in PHMA would be subject to NSO stipulations under Alternative 1, so managing ROW avoidance areas in PHMA would have no impact on fluid minerals.

All GHMA would be open to ROW location for oil and gas-related activities under Alternative 1. Identification of conservation measures to minimize surface disturbance and disrupting activities could increase the expense of developing facilities for oil and gas operations by limiting routing options and requiring the use of more expensive technology.

Impacts from Fluid Minerals (Including Mineral Split Estate)

Application of the density and disturbance caps in PHMA and lek buffers in PHMA and GHMA could impact both new and existing oil and gas activities by preventing or restricting new surface development. New oil and gas activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. The BLM would not apply the density and disturbance caps in a manner that would eliminate reasonable opportunities to develop an existing lease. Applying lek buffer distances when approving actions could also restrict development of infrastructure-related fluid mineral development. Under Alternative 1, except that the lack of waivers and modifications, combined with the limited exceptions for NSO stipulations under Alternative 1 Amendment, would further restrict oil and gas activities.

Under Alternative I, federal oil and gas estate in PHMA would be open to fluid mineral leasing subject to NSO stipulations. The unleased federal oil and gas estate in PHMA would be subject to these stipulations. Under this alternative, there would be no waivers and modification, and limited exceptions for NSO stipulations which would further restrict oil and gas activities.

All GHMA would be subject to CSU stipulations. Impacts of these stipulations would be the same type as those described under *Nature and Type of Effects* in **Section 4.2.1** above.

Under Alternative 1, it is projected that 51 new exploratory and development wells would be drilled on federal oil and gas estate in the short term. Of these new wells, 42 are expected to be producing oil and gas wells in the long term**.**

In addition to RDFs and limitations on disturbance, structure height restrictions would apply under Alternative 1. Closing areas within GRSG habitat to fluid mineral leasing would directly impact the fluid minerals program by prohibiting the development of those resources on federal mineral estate. Fluid mineral operations would be limited in their choice of project locations and may be forced to develop in areas that are challenging to access or have less economic resources because more ideal areas could be closed to leasing. No quantitative percentage limit, surface occupancy buffers, or TL would apply to surface disturbance. Surface disturbance would prevent or minimize disturbance to GRSG and their habitat. Unitization would occur on a case-by-case basis.

Geophysical exploration would be allowed, except for in PHMA, where geophysical exploration would be limited to use of existing roads and trails, as well as helicopter-portable methods on the 61,197 acres of federal oil and gas estate but would be subject to TLs and other restrictions, reducing exploration opportunities.

Oregon Environmental Consequences

Impacts from Lands and Realty Management

Under Alternative 1, all BLM-administered surface in PHMA (totaling 4,547,000 acres, or approximately 36% of BLM-administered surface in the decision area) would be managed as ROW avoidance areas for fluid mineral-related activities. All PHMA would be subject to NSO stipulations on fluid mineral leases, so no fluid mineral activities on future leases within these areas would require new ROWs. Managing PHMA as ROW avoidance areas would have minimal impact on fluid minerals development but could impact the location of fluid mineral transportation pipelines if any were proposed.

All BLM-administered surface in GHMA would be managed as ROW avoidance for high voltage transmission lines and major pipelines, but open to other fluid mineral-related ROW location under Alternative 1. Fluid minerals beneath those acres would be impacted by the ROW avoidance area**.**

Impacts from Fluid Leasable Minerals Management

Under Alternative 1, 4,333,700 acres (31% of the federal mineral estate decision area), including all federal mineral estate in PHMA, would be subject to NSO stipulations; 4,319,800 acres subject to NSO stipulations would be unleased, so this management would apply NSO stipulations to 31% of the 14,147,900 unleased acres in the decision area. Application of NSO stipulations to leases on these acres would directly impact the fluid minerals program. The lack of waivers and modifications combined with the limited exceptions for NSO stipulations under Alternative 1 would further restrict oil and gas and geothermal activities. SFA would be subject to NSO stipulations with no waivers, exceptions, or modifications.

Approximately 4,847,400 acres of federal mineral estate would be subject to CSU and TL stipulations. This includes all federal mineral estate in GHMA not subject to other existing stipulations, or 34% of the federal mineral estate decision area; 4,715,500 of these acres are unleased. Application of CSU and TL stipulations to leases on these acres would directly impact the fluid minerals program

Under Alternative 1, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. PHMA and GHMA would be designated, and the BLM would implement numerous conservation measures to reduce impacts from human activities in PHMA, including a maximum 3% disturbance cap to human activities, not including wildfire, in PHMA. Application of the 3% disturbance cap in PHMA and lek buffers in GHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in an Oregon priority area of conservation and the proposed project area. New surface development on existing leases could be restricted if the cap were exceeded. The BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease. Applying lek buffer distances when approving actions could also restrict development of infrastructure related to fluid mineral development.

Geophysical exploration would be allowed on the 11,234,800 acres of federal mineral estate within GRSG habitat but would be subject to seasonal restrictions. Because of these limitations, geophysical exploration in GRSG habitat would decrease under this alternative. Decreases in geophysical exploration in GRSG habitat would impact the fluid minerals program.

Under Alternative 1, conservation measures in addition to RDFs would be applied as COAs to the five federal leases in PHMA. These RDFs and conservation measures would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards. The only conservation measures applied would relate to master development plans and unitization.

South Dakota Environmental Consequences

Impacts from Lands and Realty Management

Under Alternative 1, all BLM-administered surface in PHMA, exclusive of GRSG winter range, would be managed as ROW exclusion areas for fluid mineral-related activities. GHMA and GRSG winter range would be ROW avoidance areas. All PHMA would be subject to NSO stipulations on fluid mineral leases, so no fluid mineral activities on future leases within these areas would require new ROWs. Managing PHMA as ROW exclusion areas would have minimal impact on fluid minerals development but could impact the location of fluid mineral transportation pipelines if any were proposed.

Impacts from Fluid Leasable Minerals Management

Under Alternative 1, 152,100 acres (45% of the federal mineral estate decision area), including all federal mineral estate in PHMA and GRSG winter range in GHMA, would be subject to NSO stipulations. Application of NSO stipulations to leases on these acres would directly impact the fluid minerals program**.** The lack of waivers and modifications combined with the limited exceptions for NSO stipulations under Alternative 1 would further restrict oil and gas and geothermal activities.

Approximately 21,175 acres of federal mineral estate would be subject to CSU stipulations and 1,169 acres subject to TL stipulations. This includes all federal mineral estate in GHMA in nesting and brood-rearing habitat near leks. Application of CSU and TL stipulations to leases on these acres would directly impact the fluid minerals program.

Under Alternative 1, the BLM would manage lands to conserve, enhance, and restore GRSG habitat. PHMA and GHMA would be designated, and the BLM would implement numerous conservation measures to reduce impacts from human activities in PHMA, including a maximum 3% disturbance cap to human activities in a BSU and 5% cap including wildfire and agriculture at the project level. Application of the disturbance cap in PHMA and lek buffers in GHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in a BSU and the proposed project area. New surface development on existing leases could be restricted if the cap were exceeded. The BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease. Applying lek buffer distances when approving actions could also restrict development of infrastructure related to fluid mineral development.

Under Alternative 1, conservation measures in addition to RDFs would be applied as COAs to federal leases in PHMA. These RDFs and conservation measures would include such requirements as surface disturbance limitations, TLs, noise restrictions, structure height limitations, design requirements, water development standards, remote monitoring requirements, and reclamation standards.

Utah Environmental Consequences

Application of the 3% disturbance cap in PHMA could impact both new and existing fluid mineral activities by preventing or restricting new surface development. New fluid mineral activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. The BLM would not apply the disturbance cap in a manner that would eliminate reasonable opportunities to develop an existing lease. Currently there are no population areas where the level of disturbance exceeds the disturbance cap. Tere are areas within 4 miles of a lek in population areas that are near or exceeding the disturbance cap, including in the Carbon and Uintah Population Areas where there is higher potential for oil and gas.

Application of lek buffers in GHMA could impact new and existing fluid mineral activities by restricting new surface development. Lek buffers in PHMA would not impact fluid mineral development because all PHMA would be subject to NSO stipulations. Any development for which the limited exception to the NSO stipulation were granted would not be within the lek buffer. In GHMA, applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, tall structures (including transmission lines), surface disturbance, and noise could also restrict development of infrastructure related to fluid mineral development, especially in areas of high potential for oil and gas.

In PHMA, the density of energy and mining facilities would be limited to one energy/mining facility per 640 acres. When calculated at the project level, this requirement would push developers to consolidate facilities and, where technically feasible, directionally or horizontally drill from outside of GRSG habitat.

RDFs would be applied in PHMA and GHMA. However, exceptions to the application of RDFs could mitigate impacts on fluid minerals. Exceptions would occur where a design feature was not applicable (e.g., a resource is not present on a given site) or where the design feature would not actually provide additional protection for GRSG or its habitat. Disturbance caps, lek buffers, and density restrictions, additional conservation measures in PHMA would include net conservation gain requirements, restrictions on noise and tall structures, and seasonal restrictions. These combined would restrict oil and gas development. In the Carbon and Uintah Population Areas, where oil and gas potential is relatively high and some areas are at or exceeding the disturbance cap, the cumulative effect of all of the restrictions would likely reduce opportunities for oil and gas development on public lands.

Exploration would be allowed on federal mineral estate within GRSG habitat but would be subject to seasonal restrictions.

Infrastructure Development (including all ROWs and utility corridors)

Management actions for programs related to infrastructure development other than lands and realty would not impact fluid minerals. Only the impacts from lands and realty management actions are discussed in the paragraphs below.

Under Alternative 1, all BLM-administered surface within PHMA not already managed as ROW exclusion would be managed as ROW avoidance for new linear and site-type ROWs, except for within ROW corridors designated for aboveground use. All acres in PHMA would be either closed to leasing or open subject to NSO stipulations, so no oil and gas activities on future leases within these areas would require new ROWs.

Under Alternative 1, 3,219,000 acres (97%) of BLM-administered surface within the decision area in Utah would continue to be open to ROW location. Wherever there is overlap between federal oil and gas leases and the 94,800 acres (3%) of BLM-administered surface in the decision area that would continue to be managed as ROW avoidance or exclusion under this alternative, the fluid minerals program could be indirectly impacted by the resulting limits on the available means for transporting fluid minerals to processing facilities and markets. Impacts would be mitigated where new ROWs could be collocated within existing ROWs. Leases within units would not be impacted as much because infrastructure within these unitized leases is exempt from ROW requirements.

Impacts would be mitigated for existing leases in PHMA because collocation of new ROWs close to existing ROWs and minimal construction of new roads would be allowed. In PHMA, ROW development that was able to occur would be subject to RDFs, lek buffers, the disturbance cap, and limitations for tall structures, and net conservation gain requirements, which could impact fluid minerals development. The expense of these mitigation activities would increase the costs of oil and gas development.

Under Alternative 1, GHMA would be available for the types of ROW location that could impact fluid minerals development, except for 17,600 acres already managed as exclusion. While fluid minerals development would not be directly impacted because of ROW avoidance or exclusion areas, ROW development in GHMA would be subject to RDFs, lek buffers, and net conservation gain requirements,

which could impact fluid minerals development. The expense of these mitigation activities would increase the costs of oil and gas, oil shale, and tar sands development.

Mineral Development

Management actions for mineral programs other than mineral materials and fluid minerals would not impact fluid minerals. Therefore, only the impacts from mineral materials and fluid mineral management actions are discussed in the paragraphs below.

Mineral Materials

Under Alternative 1, PHMA in Utah would be closed to commercial mineral material disposal. PHMA on lands in the Utah portion of the planning area would be closed to commercial mineral material disposal. This includes 1,196,000 acres with mineral material occurrence (92% of federal mineral estate with mineral material occurrence in the decision area). Closing these areas to mineral material disposal could indirectly impact fluid minerals in the areas by reducing the amount of readily available material for road and pipeline construction. This could limit the available means for accessing fluid mineral resources and transporting those resources to processing facilities and markets and could ultimately decrease the amount of development of federal fluid minerals in the planning area.

Free use permits and expansion of existing active pits in PHMA would be subject to the disturbance cap, density of energy/mining facilities restrictions, lek buffers, RDFs, noise restrictions, seasonal restrictions, and net conservation gain requirements. These requirements, particularly on the expansion of existing active pits, would further restrict access to mineral materials and increase costs associated with fluid minerals development.

Fluid Minerals

Outside of the areas closed to new fluid mineral leasing, the remaining PHMA would be open to new oil and gas leasing subject to an NSO stipulation. Of this area, NSO stipulations on approximately 7% of federal mineral estate would not be available with waivers, exceptions, or modifications. These areas are in the Rich and Box Elder Population Areas. The Box Elder Population Area does not have high potential for oil and gas, so impacts would be minimal. The potential in the Rich Population Area is high. Most federal mineral estate in the Rich Population Area is already under lease, and many oil and gas fields have already been depleted. Impacts of the 233,400 acres subject to NSO with no waivers, exceptions, or modifications would be minimal.

In the remainder of PHMA, an exception to the NSO stipulation could be granted if the activity would not have direct, indirect, or cumulative effects on GRSG or its habitat or is proposed as an alternative to a similar action occurring on a nearby parcel and would provide a clear conservation gain to GRSG. Any exception must have to concurrence of the state wildlife agency and the USFWS. As such, exceptions would only be granted on rare occasions. Any development that did occur in PHMA would be subject to the pertinent management for discretionary activities (mitigation measures, disturbance cap, minerals/energy density restrictions, lek buffers, seasonal restrictions, and RDFs). Impacts of which are discussed under Special Status Species – GRSG.

Approximately 30,000 acres in GHMA would also be closed to fluid mineral leasing. GHMA near leks would be managed as NSO, the NSO buffer from the leks would vary by office. In GHMA, development would be subject to the disturbance cap, mitigation, lek buffers, and RDFs.

Wyoming Environmental Consequences

Under Alternative 1, 883,670 acres in Wyoming would be closed to oil and gas leasing. This, in addition to other restrictions, such as NSO on 441,690 acres and CSU on 6,438,480 acres within PHMAs and GHMAs would reduce the number of projected oil, gas, and CBNG wells projected under this alternative. In total, 12,355 oil and gas and 2,462 CBNG wells are projected over the life of the plan under this alternative. Drainage of federal minerals on areas closed to leasing or on leases that are shut in on an annual basis due to timing and distance limitations may occur due to development on adjacent private or state lands.

Density limitations of one oil and gas or mining location per 640 acres and a 5% disturbance cap within PHMAs (core only) would slow mineral development and could also lead to the relocation of well pads, access roads, pipelines, and ancillary facilities. Relocation of these proposed facilities could cause temporary delays in developing oil and gas resources and limit oil and gas activities in these areas.

Applying BMPs to federal mineral estate where the surface ownership is non-federal could restrict the ability of mineral operators to efficiently develop mineral resources. Depending on the stipulations required, these requirements could increase delays in mineral development.

Avoiding primary and secondary roads within 1.9 miles of the perimeter of occupied GRSG leks and prohibiting other new roads within 0.6 miles of the perimeter of occupied GRSG leks within PHMAs could lead to the relocation of well pads, access roads, pipelines, and ancillary facilities. Relocation of these proposed facilities could cause temporary delays in developing oil and gas resources and could limit oil and gas activities in these areas.

Alternative 2

Rangewide Environmental Consequences

In PHMA management would be the same as Alternative 1, except Colorado has no closed areas. In GHMA, management would be the same as Alternative 1, except Colorado changed the closure areas to NSO.

Mitigation: The BLM in Montana, North Dakota, South Dakota, Nevada, California, and Oregon would apply the same mitigation as Alternative 1. The BLM does not require compensatory mitigation but will enforce state mitigation policies and programs. Colorado and Idaho provide mitigation resulting in no net loss. Utah and Wyoming removed the net conservation gain requirement. Colorado, Idaho, Nevada/California, Oregon, Utah, and Wyoming specify that compensatory mitigation would be voluntary, unless required by laws other than FLPMA or by the State.

The 3% disturbance cap does not include wildfire or agriculture. In Idaho the cap can be exceeded in utility corridors if there is a demonstrated benefit to GRSG. In Utah the disturbance cap can be exceeded if it will benefit GRSG. The cap is applied at the BSU and project scale except in Idaho which just applies it at the BSU scale. In Montana and Wyoming, a 5% disturbance cap which includes disturbance from wildfire and agriculture, is applied at the project area scale in PHMA.

In Colorado, Idaho, Oregon, and Montana and Dakotas field offices, priority will be given to leasing and development of fluid mineral resources, including geothermal, outside of PHMAs and GHMAs, or within the least impactful areas within PHMA and GHMA if avoidance is not possible. In Utah, Nevada/California, and the Lewistown and Butte field offices no similar objective exists.

In Wyoming, leasing would be allowed in PHMA, and if the BLM has a backlog of Expressions of Interest for leasing, the BLM will prioritize work to first process Expressions of Interest in non-habitat, followed by lower

habitat management areas (e.g., GHMA). In Wyoming for fluid mineral development on existing leases that could adversely affect GRSG populations or habitat, the BLM would work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts consistent with lessees' rights.

In Montana/Dakotas, Oregon, and Wyoming no waivers or modifications would be issued. An exception can be considered if the excepted action is an alternative to action on nearby parcels that would be more harmful to GRSG).

In Idaho no waivers or modifications would be issued in PHMA, IHMA or GHMA. An exception can be considered if the excepted action is an alternative to action on nearby parcels that would be more harmful to GRSG, no concurrent approval from other agencies is required.

Colorado, Nevada/California, and Utah developed state-specific exceptions, modifications, and waivers. If a state is not specifically mentioned under environmental consequences, the rangewide consequences would apply.

Colorado Environmental Consequences

In Colorado, the BLM anticipates differing effects for this fluid minerals. Under Alternative 2, approximately 224,200 acres that are closed to fluid mineral leasing under the Alternative 1 would be open for fluid mineral leasing subject to NSO stipulations. Opening the 224,200 acres for fluid mineral leasing means that there is the potential for revenue generation associated with leasing and developing fluid mineral resources.

Approximately 34% of the federal mineral estate in PHMA is currently unleased, including approximately 29% with high potential for oil and gas. There are numerous considerations that operators consider before acquiring and developing leases, including market value of the commodity being produced, operational costs, ease of access to lease minerals, practicality of necessary infrastructure such as roads and pipelines, and technological capabilities. It is difficult to predict if these changes to availability of leases and increased flexibility of the WEMs (Waivers, Modifications, and Exceptions) would lead to additional oil and gas development or a varied approach to the same level of development. In GHMA the closure to leasing under Alternative 1 would change to open to leasing with an NSO stipulation under Alternative 2, this would make more acres available for leasing, potentially resulting in increased production of fluid mineral resources.

Idaho Environmental Consequences

In Idaho, the BLM anticipates differing effects for fluid minerals. PHMA and IHMA not already closed to leasing would be open to oil and gas leasing subject to NSO stipulations. This alternative would maintain Sagebrush Focal Areas (SFAs) from Alternative 1.

Montana Environmental Consequences

Montana did not complete a 2019 Plan Amendment, management and impacts on fluid minerals under this alternative would be the same as described under Alternative 1.

Alternative 3

Rangewide Environmental Consequences

Under alternative 3 all areas managed for GRSG would be PHMA and fluid minerals in these areas would be closed to leasing. Some states are considering expanding HMAs to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA. For valid existing rights the ROW exclusion within PHMA could preclude development of a lease.

ACECs will be considered under this alternative, though because of the restrictive nature of the PHMA management under this alternative, there would be no different allocations between the PHMA and the potential ACEC boundaries.

In areas with development potential for oil and gas resources, closing PHMA to leasing would result in a reduction in oil and gas development and production.

Alternative 4

Rangewide Environmental Consequences

The amount of fluid mineral acreage available for leasing under this alternative is similar to Alternative 1, but the amount that will be leased under Alternative 4 is difficult to predict because leasing in GRSG habitat areas will occur following a process in which parcels for lease are identified by received EOIs and evaluated based on fluid mineral and GRSG habitat criteria in order to determine which parcels are offered for lease. Parcels could be nominated and leased with potentially prohibitive stipulations which could discourage operators from further development. Geothermal leasing would occur following a similar process as described above but evaluation criteria would be adjusted to recognize the differences between geothermal development and petroleum fluid mineral development.

Compared to existing management this alternative would apply similar NSO stipulations to leasing in PHMA and IHMA, and around Leks in GHMA. In some states this alternative would make more acreage available for leasing, but because of the prioritization process for leasing EOIs it is possible that fewer acres could be offered for lease sale. State specific changes for Colorado, Oregon, and Wyoming are discussed below. A 3% disturbance cap would apply at the HAF fine scale habitat selection area in PHMA/IHMA, which could limit development, however very few areas are over or near the disturbance cap at this time. This cap could result in a delay in the timing of future fluid mineral exploration or development; however, the magnitude of the delay would depend on site-specific factors including the current level of habitat assessment that has been conducted to date. If a state is not specifically mentioned under environmental consequences, the rangewide consequences would apply.

Colorado Environmental Consequences

In Colorado, the BLM anticipates differing effects for fluid minerals. Under Alternative 4 more acreage would be available for leasing EOIs and potential leasing than under Alternative 1, this is because under Alternative 4 the plan would no longer apply closures within one mile of leks in GHMA.

Oregon Environmental Consequences

In Oregon, the BLM anticipates differing effects for fluid minerals. Under Alternative 4 more acreage would be available for leasing EOIs and potential leasing than under Alternative 1, this is because under Alternative 4 the plan would no longer apply closures within one mile of leks in GHMA.

Wyoming Environmental Consequences

In Wyoming, the BLM anticipates differing effects for fluid minerals. Unlike in other states, in WY NSO stipulations would be applied to leasing only within 0.6 miles of leks in PHMA and within 0.25 miles of leks in GHMA. Compared to Alternative 1, this alternative would make more acres available for leasing without NSO stipulations.

Alternative 5

Rangewide Environmental Consequences

Impacts on fluid minerals under Alternative 5 would be less than those described for Alternative 4 because fewer acres would be subject to an NSO stipulation (e.g., PHMA in WY would be 0.6-mi NSO around leks with TL stipulations in the rest of PHMA). Under this alternative more flexible WEMs would be considered in all states, allowing compensatory mitigation and the potential for more areas open to leasing with reduced major and minor operational constraints.

Alternative 6

Rangewide Environmental Consequences

Impacts would be the same as those described for Alternative 5 with the additional designation of ACECs. Management of ACECs as open to leasing subject to NSO stipulations with an exception/modification to allow occupancy if there are drainage concerns from adjacent development and if it can be demonstrated that no direct or indirect impacts on GRSG will occur would increase impacts on fluid minerals compared with Alternative 1.

10.10.2 Nonenergy Leasable Minerals

Methodology

Analysis of impacts on nonenergy 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 nonenergy leasable mineral development would result from closure of an area to nonenergy 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 nonenergy 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. The types of actions that can result in these impacts are discussed in more detail in **Section 4.10.2**, Nature and Type of Effects. Additional actions or conditions that would cause direct or indirect impacts on nonenergy leasable minerals are described under indicators below.

Indicators

Indicators of impacts on nonenergy solid minerals are as follows:

- The number of acres closed to nonenergy solid mineral leasing
- The number of acres closed to new nonenergy leasable surface mining
- The restrictions on surface use or timing placed on nonenergy solid mineral leasing
- The restrictions on surface use or timing placed on prospecting and exploration
- Application of RDFs to nonenergy 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.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1 most of the PHMA and IHMA in the planning area is closed to new leasing of nonenergy leasable minerals but states can consider expansion of existing leases. In Idaho, all IHMA in Known Phosphate Lease Areas is open to leasing. Wyoming keeps PHMA open subject to occupancy, seasonal limitations, disturbance, and density. Wyoming and Montana are subject to density and disturbance limits. In GHMA most states propose minimization measures to protect GRSG.

Application of the 3% disturbance cap in PHMA and lek buffers in PHMA and GHMA could impact both new and existing nonenergy leasable minerals activities by preventing or restricting new surface development and reducing ultimate recovery of the resource. New nonenergy leasable minerals activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. The BLM would not apply the disturbance cap in a manner that would eliminate all reasonable opportunities to develop an existing lease.

Applying lek buffer distances when approving actions could also restrict development of infrastructure related to nonenergy solid leasable mineral development, as could application of RDFs.

Idaho Environmental Consequences

In Idaho, the BLM anticipates differing effects for nonenergy leasable minerals.

Impacts from Nonenergy Solid Leasable Minerals Management

In Idaho, all IHMA in Known Phosphate Lease Areas is open to leasing. No leases are currently on BLM-administered lands in IHMA. All other areas of IHMA would be closed to leasing except for consideration of the expansion of existing leases. Under Alternative 1, 16,270,500 acres, or 59% of the federal nonenergy leasable mineral estate decision area (including all federal nonenergy leasable mineral estate in PHMA outside Known Phosphate Lease Areas) would be closed to prospecting and leasing. Fringe leases and modifications to existing leases would be allowed in PHMA. Approximately 2,899,800 acres, or 10% of federal nonenergy solid leasable mineral estate in the decision area (including all federal nonenergy leasable mineral estate in IHMA outside Known Phosphate Lease Areas), would be open to leasing consideration but only if the Anthropogenic Disturbance Development and Criteria (AD-4) were satisfied (including the requirement that the project would not exceed the 3% disturbance threshold). Development on these acres would also be subject to RDFs, BMPs, and buffers for exploration and initial mine development, and compensatory mitigation once mining commences.

Development of federal nonenergy leasable minerals within GHMA would also be subject to RDFs, BMPs, and buffers on exploration and initial mine development. These limitations could increase costs of federal nonenergy leasable mineral development in the planning area.

Because Known Phosphate Lease Areas in IHMA would remain open to nonenergy solid mineral leasing, which would allow continued development in most of the planning area, impacts on federal nonenergy solid leasable mineral development in Idaho would be lessened compared to a full closure of all IHMA. The areas considered to have moderate potential for future development in the decision area would not be constrained by a closure. RDFs would be applied to phosphate development projects in IHMA. These RDFs could increase the cost of phosphate mining in the decision area.

Impacts from Anthropogenic Disturbance Management, Adaptive Management, and Coordination

Under Alternative 1, anthropogenic disturbance, including nonenergy leasable mineral development, would be limited to 3% of nesting and wintering habitat on new leases and prospecting permits within IHMA within a Conservation Area (BSUs). In BSUs where the 3% cap is already exceeded, new parcels would not be offered for lease until enough habitat was restored to maintain the area under the threshold. New leases for federal nonenergy solid leasable mineral resources that would result in exceedance of the 3% cap in a BSU would also be prohibited. This cap could potentially impact activities on 2,900,100 acres of unleased federal nonenergy solid leasable mineral estate in IHMA, including 400 unleased acres within Known Phosphate Lease Areas. Impacts would be greatest where these caps limited development in unleased portions of Known Phosphate Lease Areas because these areas have the highest potential for nonenergy leasable mineral development. The 16,270,500 acres that would be closed to nonenergy solid mineral leasing under Alternative 1 would not be impacted by the disturbance cap because no new nonenergy leasable solid mineral development could occur in the closed areas.

Nevada Environmental Consequences

In Nevada, the BLM anticipates some differing effects for nonenergy leasable minerals.

Alternative 1 would require a 3% disturbance cap on human surface-disturbing activities in PHMA, and it incorporates RDFs consistent with applicable law in PHMA, GHMA, and OHMA. It would also require all human disturbances to result in a net conservation gain for GRSG and their habitat. Lek buffers would also be required.

Collectively, these GRSG conservation management actions would increase mitigation requirements for land use authorizations. This would result in more complex project designs, potentially excluding infrastructure placement in the most cost-effective locations and potentially resulting in overall greater development costs. A corresponding effect could be a reduction in the number of authorization applications received for activities in PHMA and longer, more complicated review periods for those that are proposed in PHMA.

Management actions for mineral programs other than nonenergy leasable minerals would not impact nonenergy leasable mineral development. Therefore, only the impacts from nonenergy leasable minerals management actions are discussed in the paragraphs below.

Impacts from Nonenergy Leasable Minerals Management

Under the Alternative 1, 10,739,100 acres of the decision area would be closed to nonenergy leasable mineral development. Expanding existing leases would be considered in PHMA. Impacts of this closure would be the same type as those described under Nature and Type of Effects.

Alternative 1 includes applying RDFs on all GRSG habitat, which would mean additional conservation measures for the protection of GRSG consistent with applicable law. Impacts from the RDFs would likely result in higher costs and longer time frames for developing nonenergy leasable minerals. RDFs would require placing operations and facilities as close together as possible, would minimize site disturbance through site analysis and planning, and would phase development with concurrent reclamation.

Oregon Environmental Consequences

Impacts from Lands and Realty Management

Under Alternative 1, all BLM-administered surface in PHMA would be managed as ROW avoidance areas for nonenergy leasable-related activities. All PHMA would be closed to new leases and prospecting permits, so managing PHMA as ROW avoidance areas would have no impact on nonenergy leasable minerals.

BLM-administered surface in GHMA would be managed as ROW avoidance for high voltage transmission lines, major pipelines, but open to other nonenergy leasable mineral-related ROW location under Alternative 1.

Impacts from Nonenergy Leasable Minerals Management

The BLM would close all PHMA to nonenergy solid mineral leasing under Alternative 1. This would result in 7,247,900 acres (51%) of federal mineral estate in the decision area being closed to prospecting and leasing.

Utah Environmental Consequences

Production rates for gilsonite and phosphate are expected to remain steady for the life of the LUPs covered by this LUPA. Total phosphate production in the Utah Sub-region may increase with the possible opening of a new phosphate mine in Utah.

Application of the 3% disturbance cap in PHMA and lek buffers in PHMA and GHMA could impact both new and existing nonenergy leasable minerals activities by preventing or restricting new surface development. New nonenergy leasable minerals activities could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. New surface development on existing leases could be restricted if the cap were exceeded. The BLM would not apply the disturbance cap in a manner that would eliminate all reasonable opportunities to develop an existing lease. Currently there are no population areas where the density of disturbance exceeds the 3% cap. There are areas within 4 miles of a lek in population areas that are near or exceeding the disturbance cap, including in the Uintah Population Area where there is high occurrence and existing development of phosphate.

Applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, surface disturbance, and noise could also restrict development of nonenergy leasable minerals.

RDFs would be applied as under the action alternatives in PHMA and GHMA. In addition to the RDFs, disturbance cap, lek buffers, and density restrictions, additional conservation measures in PHMA would include net conservation gain requirements (also a requirement in GHMA), restrictions on noise, and seasonal restrictions. All of these combined could further restrict nonenergy leasable minerals development. Based on the disturbance cap and these other restrictions, it is unlikely that the existing phosphate and gilsonite mines could expand or that new phosphate or gilsonite mines would be approved on federal mineral estate in the decision area.

All sodium occurrence in the decision area is in PHMA and, under Alternative 1, PHMA would be closed to new nonenergy minerals leases. The occurrence of sodium is largely present outside of GRSG HMAs, so the overall impact on sodium development in Utah would be minimal.

Approximately 673,600 acres (16%) of federal mineral estate in the decision area would be open to leasing consideration for both surface and underground mining, all of which would be in GHMA. In GHMA, development would be subject to mitigation and lek buffers.

Gilsonite. Under Alternative 1, all federal mineral estate with gilsonite potential in the decision area would be within GHMA and would be open to nonenergy leasable mineral leasing. New leases in GHMA would be subject to mitigation and lek buffers. The 2,700 acres of authorized gilsonite leases in mapped occupied habitat would lie within GHMA and would be subject to current lease-specific surface disturbance limitations and/or BMPs included in those leases or approved plans governing the leases.

Phosphate. Under Alternative 1, 186,700 acres (88%) of federal mineral estate with phosphate potential in the decision area would be closed to new nonenergy leasable mineral prospecting and exploration and leasing, including all of federal mineral estate with high phosphate potential in the decision area. New leases adjacent to existing operations would be allowed. This allowance for new leases adjacent to existing operations would reduce impacts on locatable minerals from the closure of PHMA to new nonenergy leasable mineral leasing by allowing continued development around ongoing operations. These new leases would be subject to restrictive management which would likely preclude new surface development associated with new and existing phosphate leases, where existing surface infrastructure could be used for underground development on new leases development would continue, but if that were not feasible operations in PHMA could be forced to close once existing reserves are exhausted.

The mineral potential report for the Vernal RMP identifies continued development of phosphate on nonfederal mineral estate during the period of analysis (through 2017). It does not anticipate any development on federal mineral estate during the period of analysis. Since completion of that report, the phosphate mine in PHMA has changed ownership. Given current mineral holdings on private lands, it is anticipated that mining operations will be able to continue on private lands for 15 years. As the current mine on private lands expands, it is foreseeable that existing mining operations would progress to the edge of the nonfederal mineral estate. Development of federal mineral estate would likely not be consistent with the disturbance cap, so the mine would have to be redirected to other areas with nonfederal minerals or change mining methods

These changes would increase the cost of phosphate mining or, if the cost were deemed too high by the developer, potentially result in phosphate ore being left in place on federal mineral estate. Depending on the size of the federal minerals tract, this could result in either a loss (temporary lack of mining) or waste (permanent lack of mining if the remaining federal mineral resource is not economical to return to develop later) of federal mineral resources. This is because the mine on private lands would be reclaimed, then, if at some future date the federal minerals are available for mining, the minerals on the federal tract would generally not be economical to return to mine. While mining operations would be able to continue, there would be an increase in costs to the mine to use underground mining, move operations around the federal tracts, or redirect to other portions of the private lands. Restricting access to phosphate could hamper the production of fertilizer products needed to produce food.

Sodium. Under Alternative 1, none of the federal mineral estate with sodium occurrence in the decision area would be open to nonenergy leasable mineral leasing. This would reduce the availability and potentially the amount of development of sodium in Utah.

Wyoming Environmental Consequences

In Wyoming PHMA would be managed as open subject to occupancy, seasonal limitations, disturbance, and density. Seasonal restrictions, and density and disturbance limits would be applied to nonenergy leasable mineral development.

Alternative 2

Rangewide Environmental Consequences

In PHMA all states would apply the same management and expect the same resulting impacts on nonenergy leasable minerals as described under Alternative 1 above. The only change is that Nevada would add exception criteria to the closure in PHMA, described under the Nevada Environmental Consequences section below.

In GHMA all states would apply the same management and expect the same resulting impacts on nonenergy leasable minerals as described under Alternative 1 above.

Montana, North Dakota, South Dakota, Nevada/California, and Oregon would apply the same mitigation as Alternative 1. The BLM does not require compensatory mitigation but will enforce state mitigation policies and programs. Colorado and Idaho require mitigation resulting in no net loss. Utah and Wyoming removed the net conservation gain requirement. Colorado, Idaho, Nevada/California, Oregon, Utah, and Wyoming specify that compensatory mitigation would be voluntary unless required by laws other than FLPMA, or by the State.

Under Alternative 2, in all states except Montana and Wyoming, the 3% disturbance cap does not include wildfire or agriculture. In Idaho, the cap can be exceeded in utility corridors if it will benefit GRSG. In Utah the 3% disturbance cap can be exceeded if will benefit GRSG. The cap is applied at the BSU and project scale except in Idaho where it is applied at the BSU scale only. In Montana and Wyoming, a 5% disturbance cap is applied at the project area scale in PHMA, it includes disturbance from wildfire and agriculture.

Nevada Environmental Consequences

Nevada added exception criteria to the closure in PHMA, allowing leasing of nonenergy leasable minerals under certain circumstances. This would improve the availability of nonenergy leasable minerals in the planning areas compared to Alternative 1.

Alternative 3

Rangewide Environmental Consequences

Under this alternative, all PHMA and IHMA, including all proposed ACECs, would be closed to new nonenergy mineral leasing; there would be no GHMA. 100% of the decision area (including acreage already closed) would be closed under Alternative 3, so impacts would increase compared with Alternative 1. COAs would be applied to existing leases where applicable and feasible. These COAs would include no new surface occupancy on existing leases within 1 mile of active leks, and within 2 miles of active leks within PHMA. If the lease is entirely within the active lek buffer, require any development to be placed in the area of the lease least harmful to GRSG based on vegetation, topography, or other habitat features. This Alternative would limit permitted disturbances to 1 disturbance per 640 acres average across the landscape in PHMA. Disturbances may not exceed 3% in PHMA in any biologically significant unit and proposed project analysis area.

Idaho Environmental Consequences

<u>Impacts from Nonenergy Solid Leasable Minerals Management</u>

Impacts under Alternative 3 are the same as those described under Alternative 1, except that more acres would be affected by closures (21,629,700 acres, or 78% of the nonenergy leasable decision area). The magnitude of impacts under this alternative would increase compared with Alternative 1 since 473 acres of existing phosphate leases on BLM-administered lands would occur in PHMA. Less than 1% of the acres closed to leasing would be within Known Phosphate Lease Areas. Because the number of unleased acres within Known Phosphate Lease Areas that are closed would increase compared with Alternative 1, impacts on nonenergy solid leasable minerals would increase under this alternative.

Approximately 5,730 acres of existing unmined federal nonenergy leasable mineral leases in PHMA and GHMA would be subject to RDFs. This would limit surface disturbance, vehicle use, siting, and design of mineral development operations, in addition to imposing reclamation requirements. Application of RDFs

would have the types of impacts described under Nature and Type of Effects**.** Because these RDFs would not be applied under Alternative 1, impacts would increase under Alternative 3.

Under Alternative 3, 19,167,400 acres, or 69% of the federal nonenergy solid leasable mineral estate decision area (including all federal nonenergy solid leasable mineral estate in PHMA), would be closed to prospecting and leasing. New leases to expand existing mines for phosphate would not be permitted in areas managed as closed.

Utah Environmental Consequences

Under Alternative 3 all federal mineral estate in the federal mineral estate decision area (4,008,600 acres) would be closed to new prospecting and exploration and leasing. Management under this alternative would close more federal mineral estate to nonenergy leasable mineral prospecting and exploration and leasing than management under Alternative 1. This allocation decision would impact gilsonite, phosphate, and sodium. New leases to expand existing mines for these minerals also would not be permitted. Closing areas to nonenergy mineral leasing would result in the same type of impacts as those described under *Nature and Type of Effects*.

Under Alternative 3, exploration would be prohibited on all 4,008,600 acres of federal mineral estate within the decision area. Closing the decision area to exploration could reduce the availability of data on nonenergy leasable mineral resources outside the decision area and could increase costs of nonenergy leasable mineral development if it resulted in the need to conduct exploration for resources outside the decision area via less easily accessible locations than the locations within the decision area from which exploration might otherwise occur. Operators with existing leases would still be able to conduct new exploration on those leases.

Alternative 4

Rangewide Environmental Consequences

Under this alternative, nonenergy leasable minerals would be managed the same as under Alternative 1; the impacts would be the same as described under Alternative 1 above, but would be applied to different HMA areas. In Idaho, 1 acre of existing phosphate leases would be within IHMA and 472 acres would be within GHMA.

Nevada and Northeastern California Environmental Consequences

In Nevada and northeastern California, exceptions to the nonenergy leasable mineral closure in PHMA under may allow for increased development of nonenergy leasable minerals in some locations.

Alternative 5

Rangewide Environmental Consequences

Under this alternative, nonenergy leasable minerals would be managed the same as under Alternative 1; the impacts would be the same as described under Alternative 1 above, but would be applied to different HMA areas. In Idaho, no existing phosphate leases would be within HMAs on BLM-administered lands.

Nevada and Northeastern California Environmental Consequences

Impacts would be the same as described for Alternative 4.

Alternative 6

Rangewide Environmental Consequences

Under this alternative, impacts would be the same as described under Alternative 5 except that any existing nonenergy leasable operations within ACECs would not be able to expand on federal mineral estate and no new operations would be permitted in ACECs.

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. The types of actions that can result in these impacts are discussed in more detail in **Section 4.10.3**, Nature and Type of Effects. 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.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming manage PHMA as "essential habitat" for unsuitability evaluation. In GHMA there is no state specified special coal management.

Idaho, Nevada, California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development.

Colorado Environmental Consequences

Under this alternative, the BLM would find coal resources unsuitable for future leasing when GRSG cannot be adequately protected. In addition, the BLM would have flexibility in approving projects with adequate

design and mitigation, subject to a 3% disturbance cap. Restrictions on land use and other authorizations would be included under the Alternative 1, as follows:

- Managing both PHMA and GHMA as ROW avoidance areas
- Prohibiting aboveground structures within 1 mile of active leks
- Restricting surface disturbance to 3% in PHMA

This Alternative provides opportunity for new or expanded mines, subject to restrictions on the amount of surface disturbance in PHMA and ADH areas.

Impacts of the restrictions and authorizations would be as described under *Nature and Type of Effects,* above.

Montana Environmental Consequences

Coal exploration under Alternative 1 would not be allowed on about 93,925 acres of BLM-administered coal mineral estate pursuant to 43 CFR Part 3410.1-1(a)(1) and 43 CFR Part 3465.1(d). About 13,659 acres where exploratory coal drilling would be disallowed fall within the areas designated as coal with development potential.

In areas where coal exploratory drilling would be allowed mitigation such as specialized design features or requiring maintenance of habitat functionality or avoidance would likely be required. These actions would delay permitting and increase the operator's costs for exploratory coal drilling. Requirements for specialized design features or mitigation would allow the operation to occur.

North Dakota Environmental Consequences

There has been no coal development within the planning area. While the Bowman-Gascoyne Known Recoverable Coal Resource Area intersects PHMA and GHMA, no additional development of this field is anticipated within the planning period. This Known Recoverable Coal Resource Area has low development potential, and no interest has been expressed in developing the area.

Lignite is being mined in other areas of the state. The Known Recoverable Coal Resource Area within the planning area was not designated as a Coal Study Area because it was determined not to have sufficient economic coal resources. No coal development is foreseeable in the planning area, coal resources in the planning area are not expected to be impacted by management actions proposed in this RMPA. Potential future surface mining could be precluded as a result of suitability determinations in PHMA (87,443 acres) under Alternative 1.

Utah Environmental Consequences

Measures to protect GRSG and its habitat (disturbance cap, lek buffers, net conservation gain requirements, and restrictions on noise and season) could affect the feasibility of new underground coal leases or the expansion of existing underground operations (e.g., increased costs and development delays due to limits on the timing of activities) but would not preclude them.

Application of a 3.1-mile lek buffer could affect mine placement, though the required buffer distance could be adjusted based on local topography.

Wyoming Environmental Consequences

Consideration of coal leasing within GRSG core, connectivity, and general habitat areas would allow for future development of these resources. Areas available for coal leasing would be dependent on the results of the coal screening process and the application of appropriate mitigation measures. Allowing coal

exploration would enhance the development of these resources. Designating PHMA as "essential habitat" for unsuitability evaluation would impact 338,533 acres which would restrict the ability to develop coal over 2% of GRSG habitat areas.

Alternative 2

Rangewide Environmental Consequences

In all states except Utah management and impacts on coal resources would be the same as described under Alternative 1. Colorado, Montana, North Dakota, South Dakota, and Wyoming all PHMA would be "essential habitat" for unsuitability evaluation. Idaho, Nevada California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development.

Utah Environmental Consequences

In Utah essential habitat would be identified as part of future unsuitability criteria, compared to Alternative 1 where all PHMA would be considered as "essential habitat" for unsuitability evaluation this might give flexibility to consider leasing in small areas that were included in PHMA but do not meet the criteria for essential habitat, such as important connectivity areas. Impacts would likely be minimal because the amount of PHMA that does not meet essential habitat criteria is small. Impacts would otherwise be the same as described under Alternative 1.

Alternative 3

Rangewide Environmental Consequences

All areas managed for GRSG would be PHMA. All essential habitat would be identified as part of future unsuitability criteria. compared to Alternative 1 where all PHMA would be considered as "essential habitat" for unsuitability evaluation, this change in management might give flexibility to consider leasing in small areas that were included in PHMA but do not meet the criteria for essential habitat, such as important connectivity areas. Impacts of this management change would likely be minimal because the amount of PHMA that does not meet essential habitat criteria is small. Impacts of this alternative would otherwise be the same as described under Alternative 1.

Idaho, Nevada, California, and Oregon did not address coal due to absence of coal mineral in deposits with a reasonably foreseeable possibility of development.

Alternative 4

Rangewide Environmental Consequences

Under Alternative 4 the consideration of PHMA as essential habitat for unsuitability evaluation in CO, MT/DK, UT, and WY state that PHMA would be removed as some areas of PHMA do not meet essential habitat criteria. Almost all essential habitat is likely to overlap with PHMA so the impacts would be approximately the same as described under Alternative 1. The plan will not modify any existing suitability and unsuitable determinations. The proposed management under this alternative would apply rangewide, but the planning area in Idaho, Nevada, California, and Oregon does not have coal mineral in deposits with a reasonably foreseeable possibility of development so no impacts on coal would occur in these states.

Alternatives 5 and 6

Rangewide Environmental Consequences

Impacts under Alternatives 5 and 6 would be the same as under Alternative 4.

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. These types of impacts are discussed in more detail in **Section 4.10.4**, Nature and Type of Effects. 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).

Alternative 1

Rangewide Environmental Consequences

In all states, Alternative 1 recommended the withdrawal of all SFAs from location and entry under the US mining laws. After publication of the RODs in 2015, the BLM applied for these lands to be withdrawn, and the Secretary accepted the application. The BLM then initiated a process to consider the withdrawal,

pursuant to section 204 of FLPMA. If the Secretary decides to withdraw the proposed lands, this would likely result in a decrease in the exploration and development of locatable minerals in these areas. Application of seasonal restrictions, if deemed necessary in other areas, could restrict the timing, feasibility, or costs associated with locatable mineral development.

Colorado Environmental Consequences

Under Alternative 1, locatable minerals operations in PHMA would require appropriate effective mitigation for conservation to the extent necessary to comply with the standards and requirements under 43 CFR Subparts 3715, 3802, and 3809. Seasonal restrictions would be applied if deemed necessary to comply with the standards and requirements under 43 CFR Subparts 3715, 3802, and 3809. In ADH areas and in PHMA where mitigation is not otherwise required to comply with the standards and requirements, operators could be requested to voluntarily agree to suggested design features.

Access roads needed to access claims or mines would be constructed in accordance with 43 CFR Part 3809.420(b) and applicable MSHA or State standards. If it is determined by the authorized officer that an engineered road is warranted, then the BLM would typically require engineered design by the operator. This would also apply where an engineered road is warranted for exploration activities.

Idaho Environmental Consequences

Under Alternative 1, 2,968,200 acres of federal locatable mineral estate (including all acres in the SFA) were recommended for withdrawal from location and entry under the US mining laws. The BLM initiated a separate process for the Secretary to consider whether to withdraw these lands, pursuant to section 204 of FLPMA. If the Secretary ultimately withdraws all of these lands, when combined with the 5,380,200 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would total 8,348,400 acres, or 28% of the federal locatable mineral estate.

Of the 56 plans of operations and notices currently authorized within the decision area for Alternative 1, 7 (13%) are on lands that would be within the SFA under this alternative and therefore within the area previously recommended for withdrawal.

Nevada-California Environmental Consequences

Under Alternative 1, 2,731,600 acres of the decision area were recommended for withdrawal from mineral entry. Pursuant to the separate process currently underway, if the Secretary withdraws all of these lands, when combined with the 521,600 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would total 3,253,200 acres, or 20% of the federal locatable mineral estate, and 80% (13,273,400 acres) are not recommended for withdrawal.

Alternative 1 would require RDFs to all GRSG habitat as additional conservation measures where necessary to comply with the applicable standards and requirements under 43 CFR Subparts 3715, 3802, and 3809.

North Dakota and South Dakota Environmental Consequences

In North Dakota and South Dakota zero acres were recommended for withdrawal from mineral entry.

Oregon Environmental Consequences

Under Alternative 1, 1,835,800 acres of the decision area, specifically land designated as SFA, were recommended for withdrawal from mineral entry. Pursuant to the separate process currently underway, if the Secretary withdraws all of these lands, when combined with the 1,435,900 acres already withdrawn, the

acreage of withdrawn federal lands in the decision area would total 3,271,700 acres, or 23% of the federal mineral estate decision area.

Under this alternative, 117 mining claims, 1 plan of operations, and 9 exploration notices would be in the SFA. As such, all would be in the area that was recommended for withdrawal. This represents 21% of the 609 claims, plans, and notices in occupied GRSG habitat.

Under Alternative 1, 715,049 acres of BLM-administered surface in the decision area would be designated as ACECs. A plan of operations would be required for exploration operations disturbing five acres or less in these ACECs**.**

Utah Environmental Consequences

Under Alternative 1, 235,000 acres (6%) of the decision area, including the SFA, were recommended for withdrawal from mineral entry. Pursuant to the separate process currently underway, if the Secretary withdraws all of these lands, when combined with the 445,900 acres already withdrawn, the acreage of withdrawn federal lands in the decision area would be total 680,900 acres.

Under Alternative 1, 1,800 acres (less than 1%) of federal mineral estate with high potential in the decision area was recommended for withdrawal.

Of the 39 existing authorized locatable mining operations in the decision area, none would be in the SFA under Alternative 1. However, 11 mining claims would be in the SFA. Pursuant to the separate process currently underway, if the Secretary withdraws all lands in SFA, as recommended under Alternative 1, the BLM would not authorize new operations on any existing mining claims in SFA until the BLM confirmed that the mining claim was valid on the date of the withdrawal and remains valid.

Under Alternative 1, the BLM could limit surface-disturbance in PHMA if necessary to comply with the standards and requirements in 43 CFR Parts 3715, 3802, or 3809. The BLM would apply the disturbance cap, minerals/energy density, RDFs, and seasonal restrictions in PHMA and mitigation for net conservation gain and lek buffers in PHMA and GHMA if necessary to comply with the standards and requirements in 43 CFR Parts 3715, 3802, or 3809 and prevent unnecessary or undue degradation.

Wyoming Environmental Consequences

On BLM-administered lands, the BLM previously recommended for withdrawal from mineral entry within SFA portions of PHMA of 1,146,130 acres. Pursuant to the separate process currently underway, if the Secretary withdraws all of the recommendation, these withdrawals in combination with existing withdrawals on 1,761,550 acres, the total acreage of withdrawn federal lands in the decision area would total 2,907,680 acres.

Alternative 2

Rangewide Environmental Consequences

No recommendations for the withdrawal of SFAs from mineral entry are made under this alternative, except in Montana which would continue the recommendation for withdrawal of SFAs as described under Alternative 1. In all states, except Montana, the removal of any recommendation for withdrawal under Alternative 2 would have no impact. Recommendations to withdraw lands from location and entry under the Mining Law of 1872 have no impact. Only the Secretary or her designee may withdraw lands and this is done not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Montana Environmental Consequences

Montana did not remove the recommendation for withdrawal of SFAs from mineral entry as described under Alternative 1. Impacts on locatable minerals in Montana under Alternative 2 would be the same as described under the *Montana Environmental Consequences* section of Alternative 1.

Alternative 3

Rangewide Environmental Consequences

Under Alternative 3, all PHMA including proposed ACECs, would be recommended for withdrawal from mineral entry. Impacts would be similar in nature and type to those described under Alternative 1, but a much larger area would be recommended for withdrawal under this alternative (see **Table 2-3** which shows the acres of PHMA by state). If the Secretary were to decide to withdraw these areas, after the completion of the process outlined in section 204 of FLPMA, there may be limited opportunities for locatable mineral development in the decision area as described in the *Nature and Type of Effects*.

Alternatives 4 and 5

Rangewide Environmental Consequences

Alternatives 4 and 5 would not designate any SFAs and would not recommend any areas for withdrawal from mineral entry. The impacts on locatable minerals under this alternative would be the same as described under Alternative 2.

Montana Environmental Consequences

In Montana under Alternative 4, no SFAs would be designated and no recommendations for withdrawal would be made. Just as in Alternative 1, the removal of any recommendation for withdrawal under this alternative would have no impact.

Alternative 6

Rangewide Environmental Consequences

Alternative 6 would designate ACECs in the same areas as under Alternative 3, along with a requirement (per 43 CFR Part 3809.11(c)(3)) to prepare a plan of operations for exploration operations disturbing five acres or less. Processing plans of operations is more time-consuming than processing an exploration notice. Designation of an ACEC would increase costs to those operators who would otherwise conduct exploration under a notice, and potentially reduce development of locatable mineral resources on BLM-administered mineral estate in the planning area that would have resulted from exploration that could have been done under a notice.

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. The types of actions that can result in these impacts are discussed in more detail in **Section 4.10.5**, Nature and Type of Effects. 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.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, PHMA 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. This would prevent mineral materials from being sold from new locations but would allow continued use of existing pits. It would also allow new free use permits in both existing and new locations, which would allow state, county, and local governments and non-profit organizations the flexibility to cost-effectively locate mineral material sources. This could result in the displacement of mineral material mining to different areas further from locations where they are needed which would increase costs associated with use. No states would close GHMA to mineral material disposal, but most would apply minimization measures such as RDFs/BMPs and mitigation. Colorado, Idaho and Wyoming would apply state specific management, discussed under the state specific headings for those states below.

Colorado Environmental Consequences

Under this alternative, PHMA would be closed to new mineral material sales, but open to new free use permits and expansion of existing pits where certain criteria are met.

Idaho Environmental Consequences

Under Alternative 1, 15,529,000 acres (56%) of federal mineral material estate in the decision area would be closed to mineral material disposal except for the expansion of existing pits, unlike other states, in Idaho this closure extends to new free use permits. Closing PHMA to new free use permits would result in increased costs to local government road departments for road maintenance and could result in worsening road conditions in these areas. Approximately 3,079,100 acres of federal mineral material estate in the decision area would be open to mineral material disposal but only if the Anthropogenic Disturbance Development and Criteria were satisfied (including the requirement that the project would not exceed the 3% disturbance threshold). Mineral material activities in IHMA and GHMA would also be subject to RDFs, buffers, and seasonal timing restrictions. Mineral material sales from the 47 existing community pits in GRSG habitat would be subject to timing restrictions. These timing restrictions could impact some operations and therefore reduce overall sales of federal materials in the planning area.

Impacts from Anthropogenic Disturbance Management, Adaptive Management, and Coordination

Under the Alternative 1, anthropogenic disturbance, including mineral material development, would be limited to 3% of nesting and wintering habitat within PHMA and IHMA within a Conservation Area (i.e., BSUs). In BSUs where the 3% cap is already exceeded, new development of federal mineral material resources would be prohibited until enough habitat was restored to maintain the area under the threshold. Development of federal mineral material resources that would result in exceedance of the 3% cap in a BSU would also be prohibited. This cap could potentially impact activities on 3,079,100 acres of federal mineral material estate in IHMA.

Nevada Environmental Consequences

Alternative 1 would require a 3% disturbance cap on human surface-disturbing activities in PHMA and would incorporate RDFs consistent with applicable law in PHMA, GHMA, and OHMA. It would also require all human disturbances to result in a net conservation gain for GRSG and their habitat, and lek buffers would be required.

Collectively, these GRSG management actions would result in the impacts described under *Nature and Type of Effects*.

Oregon Environmental Consequences

Application of the 3% disturbance cap and in PHMA and lek buffers in PHMA and GHMA could impact mineral material activities by preventing new surface development. New mineral material pits or expansion of existing pits could be precluded if the cap were exceeded in an Oregon PAC (also known as BSU) and proposed project area. In cases where development was allowed, mitigation requirements would increase the cost of development. Applying lek buffer distances when approving actions would also restrict mineral material development in some areas.

Utah Environmental Consequences

Under Alternative 1, the application of the 3% disturbance cap in PHMA could impact mineral material activities by preventing new surface development. New mineral material pits or expansion of existing pits could be precluded if the cap were exceeded in a BSU or a proposed project analysis area. In cases where development was allowed, mitigation requirements would increase the cost of development.

Applying lek buffer distances when approving actions for surface disturbance could restrict mineral materials development in GHMA and could cause development to move away from desired locations.

Under Alternative 1, all BLM-administered surface within GHMA would be available for ROW location, except for 17,600 acres already managed as exclusion. While these areas would be open, ROW development in GHMA would be subject to lek buffers and net conservation gain requirements, which could impact mineral material development as discussed above. If disturbance is pushed to areas without restrictions, then overall demand for mineral materials will not be affected. However, if the area of new disturbance decreases across the landscape, the demand for mineral materials could be reduced.

Under Alternative 1, PHMA would be closed to mineral material disposal. This includes 1,196,900 acres with mineral material occurrence. Impacts would be somewhat mitigated because new free use permits and expansion of existing pits would be allowed, subject to restrictions. There are approximately 24,000 acres under a mineral material permit within GRSG habitat statewide. Further, with approximately 1,100 acres of existing disturbance associated with those mineral material pits there are opportunities for existing pits to expand within their existing permitted areas. Because less than 5% of the existing permitted area has been

disturbed expansion would fall under the disturbance cap at the project level for most pits. Therefore, while there may be site-specific instances where a new pit in occupied GRSG habitat is denied, the potential for this is low because there is additional development opportunity at existing sites.

Wyoming Environmental Consequences

Under Alternative 1, in Wyoming saleable mineral development (e.g., mineral material exploration, sales and free use permits) would be allowed in GRSG core, connectivity, general habitat areas which would allow for the continued use and development of these resources.

Prohibiting surface disturbing activities on 337,860 acres would result in the same type of impacts on mineral material development as those described under *Nature and Type of Effects*. Restricting surface disturbance on 160,630 acres Density limitations of a 5% disturbance cap within PHMAs (core only) would Prevent the development of new mineral material developments in areas at or above the cap. Prohibiting surface occupancy and disruptive activities within 0.6 miles of occupied leks and seasonal restrictions in GRSG nesting/early brood-rearing habitat and winter concentration areas could result increased cost associated with mineral material development.

Applying RDFs as mandatory stipulations and conservation objectives and applying BMPs to federal mineral estate where the surface ownership is non-federal would result in increased development costs. Avoiding primary and secondary roads within 1.9 miles of the perimeter of occupied GRSG leks and prohibiting other new roads within 0.6 miles of the perimeter of occupied GRSG leks within PHMAs would reduce the area where new roads needed for mineral development could be constructed.

The management of ROW exclusion areas (285,930 acres) within PHMAs and GHMAs would prevent the construction of access roads for mineral material sites, however if mineral material development were otherwise allowed in the area, sites could be constructed along existing roads which could reduce the impacts of this management.

Alternative 2

Rangewide Environmental Consequences

Under Alternative 2 proposed management and impacts would be similar to those described under Alternative 1, except in Idaho and Nevada.

Idaho Environmental Consequences

Under Alternative 2 in PHMA and IHMA managed as closed to mineral material development, Idaho would allow consideration of new free use permits. Compared to Alternative 1 this would 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.

Nevada Environmental Consequences

Under Alternative 2 Nevada would exception criteria to the mineral material disposal closure in PHMA. In PHMA, GHMA, and OHMA, the State Director (in coordination with NDOW, Sagebrush Ecosystem Technical Team, and/or CDFW) may grant an exception to the allocations and stipulations proposed if one of the following applies:

i. The location of the proposed activity is determined to be unsuitable (by a biologist with GRSG experience using methods such as (Stiver et al. 2015); lacks the ecological potential to become

marginal or suitable habitat; and would not result in direct, indirect, or cumulative impacts on GRSG and its habitat. Management allocation decisions would not apply to those areas determined to be unsuitable because the area lacks the ecological potential to become marginal or suitable habitat.

ii. The proposed activity's impacts could be offset to result in no adverse impacts on GRSG or its habitat, through use of the mitigation hierarchy consistent with Federal law and the state's mitigation policies and programs. In cases where exceptions may be granted for projects with a residual impact, voluntary compensatory mitigation consistent with the State's management goals could be one mechanism by which a proponent achieves the RMPA goals, objectives, and exception criteria. When a proponent volunteers compensatory mitigation as their chosen approach to address residual impacts, the BLM can incorporate those actions into the rationale used to grant an exception. The final decision to grant a waiver, exception, or modification would be based, in part, on criteria consistent with the state's GRSG management plans and policies.

iii. The proposed activity would be authorized to address public health and safety concerns, specifically as they relate to federal, state, local government and national priorities. iv. Renewals or re-authorizations of existing infrastructure in previously disturbed sites or expansions of existing infrastructure that do not result in direct, indirect, or cumulative impacts on GRSG and its habitat.

iv. The proposed activity would be determined a routine administrative function conducted by federal, state, or local governments, including prior existing uses, authorized uses, existing rights, and existing infrastructure (i.e., rights-of-way for roads) that serve a public purpose and would have no adverse impacts on GRSG and its habitat, consistent with the state's mitigation policies and programs.

v. Exceptions to lands that are identified for retention would be considered for disposal or exchange if they were identified for disposal through previous planning efforts, either as part of the due process of carrying out Congressional Acts (e.g., the respective Lincoln and White Pine County Conservation, Recreation, and Development Acts) or the agency can demonstrate that the disposal, including land exchanges, would have no direct, indirect or cumulative impacts on GRSG and its habitat.

These criteria could 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.

Alternative 3

Rangewide Environmental Consequences

Under Alternative 3, all areas managed for GRSG would be PHMA and saleable minerals would be closed to disposal in all PHMA. Some states are considering expanding HMAs to include areas of adjacent non-habitat, unoccupied historic habitat, or areas with potential to become habitat as PHMA. Impacts would apply across a much larger area than under Alternative 1, the magnitude of all impacts would increase under this alternative.

ACECs would also be considered under this alternative, though because of the restrictive nature of the PHMA management under this alternative, there would be no different allocations between the PHMA and the potential ACEC boundaries.

Under Alternative 3 all PHMA would be managed as ROW exclusion (outside of designated corridors), however, because all PHMA would be closed to mineral materials disposal under this alternative, the ROW exclusion areas would not impact the mineral materials program.

This alternative has the greatest impacts on saleable minerals because restrictions would be applied to the greatest number of acres, increasing the potential for reduced availability, reduced access, and increased development costs for accessing saleable minerals.

Colorado Environmental Consequences

For existing mineral material disposal sites, no new road construction would be permitted within a 4-mile buffer of a GRSG lek. Road realignments or route upgrades could occur only in certain specified situations, and closing and revegetating unneeded routes to restore GRSG habitat would apply in ADH and PHMA.

Oregon Environmental Consequences

Under Alternative 3, existing mineral materials pits in occupied habitat would also be closed to new sales. Impacts on availability of mineral materials would occur more quickly in Oregon because existing sites in closed areas could not continue to supply mineral materials.

Alternatives 4 and 5

Rangewide Environmental Consequences

Under Alternatives 4 and 5, proposed management and impacts on mineral material development would be the same as described under Alternative 1, except in Idaho as discussed under the state specific heading below.

Idaho Environmental Consequences

In Idaho, exceptions to the mineral material closure in PHMA under Alternative 2 may allow for increased development of mineral materials in some locations.

Alternative 6

Rangewide Environmental Consequences

Under Alternative 6, proposed management and impacts on mineral material development would be the same as described under Alternatives 4 and 5, except that ACECs would also be considered under this alternative. Under Alternative 6, ACECs would be closed to new all new mineral material sales and operations, except for free-use permits issued in order to support maintenance needs for existing local roads to ensure public safety. New mineral material sites for free-use should avoid ACECs, but if avoidance is not possible sites would need to comply with all the minimization measures identified for PHMA.

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.

Alternative 1

Rangewide Environmental Consequences

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources the same as fluid leasable minerals so management and impacts would be same as described under Fluid Minerals Alternative 1 in **Section 4.10.1**, above.

Proposed management and impacts in Utah are described below. Tar sands resources overlapping the planning area only exist in Utah, management and impacts on tar sands in Utah are described below.

In Utah, the BLM anticipates differing effects for this oil shale and tar sands. See the Utah Environmental Consequences for oil shale and tar sands.

Utah Environmental Consequences

Alternative 1 does not include leasing allocation decisions for oil shale and tar sands in Utah because the ROD for the Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the BLM in Colorado, Utah, and Wyoming closed all mapped occupied GRSG habitat on BLM-administered lands to oil shale and tar sands leasing and development with the exceptions of the pending lease application in the Asphalt Ridge Special Tar Sands Area and the White River Oil Shale Research, Development, and Demonstration site and Preference Lease Right Area (BLM 2013). Within these two areas, leasing and development would be allowed to occur. Management actions and allocation-based decisions being considered could impact the feasibility, amount, and type of development. For example, depending on the alternative selected, GRSG habitat that overlaps the above-mentioned areas may be subject to surface disturbance thresholds, timing restrictions, and other GRSG protection measures. Managing surrounding lands as ROW exclusion or avoidance areas could impact road and facility construction to access and develop those leases.

Under Alternative 1, no disturbance cap would be applied to anthropogenic disturbance in GHMA. The existing and pending leases would be in GHMA under this alternative, soil shale and tar sands development could continue to occur subject to stipulations and other restrictions applied in the Vernal RMP (White River Oil Shale Preference Right Lease Area) and site-specific NEPA analyses.

Oil shale and tar sands development in GHMA would be subject to RDFs, lek buffers, and net conservation gain requirements, which could impact oil shale and tar sands development by restricting new surface development. GHMA would be available for the types of ROW location needed for oil shale and tar sands development. ROW development in GHMA would be subject to lek buffers and net conservation gain requirements. Applying lek buffer distances when approving actions for linear features, infrastructure related to energy development, tall structures, surface disturbance, and noise could also restrict development of infrastructure related to oil shale and tar sands development.

Alternative 2

Rangewide Environmental Consequences

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources as fluid leasable minerals so management and impacts would be same as described in under Fluid Minerals Alternative 2 in **Section 4.10.1**, above.

Management and impacts in Utah are described below. Tar sands resources overlapping the planning area only exist in Utah, management and impacts on tar sands in Utah are described below.

In Utah, the BLM anticipates differing effects for this oil shale and tar sands. See the Utah Environmental Consequences for oil shale and tar sands.

Utah Environmental Consequences

Alternative 2 does not include leasing allocation decisions for oil shale and tar sands in Utah because the ROD for the Allocation of Oil Shale and Tar Sands Resources on Lands Administered by the BLM in Colorado, Utah, and Wyoming closed all mapped occupied GRSG habitat on BLM-administered lands to oil shale and tar sands leasing and development with the exceptions of the pending lease application in the Asphalt Ridge Special Tar Sands Area and the White River Oil Shale Research, Development, and Demonstration site and Preference Lease Right Area (BLM 2013). Within these two areas, leasing and development would be allowed to occur; however, certain management actions and allocation-based decisions being considered could impact the feasibility, amount, and type of development. Managing surrounding lands as ROW exclusion or avoidance areas could impact road and facility construction to access and develop those leases.

Alternative 2, would allow exceptions for projects to exceed the disturbance and density caps in PHMA, and allow exceptions to avoidance and minimization measures in PHMA if the area is non-habitat and indirect impacts would not occur. Allowing an exceedance to the disturbance and density caps based on site-specific habitat condition, population information, and proponent-volunteered project design elements could allow mineral development to proceed in areas that might otherwise have been precluded by the No-Action Alternative. Allowing consideration or proposed developments that could exceed the 3% disturbance cap or density cap provides the ability to potentially avoid precluding leasing/permitting, development, or consideration of associated infrastructure. Authorizing the exceedances to the disturbance and density caps would only be allowed if voluntarily developed minimization or mitigation improves GRSG habitat. While there is more flexibility and projects may no longer be precluded by the caps, proponents with potential developments may still need to evaluate GRSG conditions or propose habitat improvement projects. While projects may not be precluded by the caps, voluntarily applying the criteria could result in additional costs to implement mitigating measures. This could increase project costs and could make a proposed project uneconomical. Allowing exceptions to avoidance and minimization measures in PHMA if the area is non-habitat and indirect impacts would not occur could allow consideration of leasing/permitting and development for mineral operations.

Alternative 2 would also no longer require proponents to provide for compensatory mitigation on a project-by-project basis to show a net conservation gain. The BLM would cooperate with the State of Utah to analyze applicant-proposed, or state required or recommended compensatory mitigation to offset residual impacts. The BLM may authorize such actions consistent with NEPA analysis and the governing RMP. Not requiring proponents to pay for vegetation and habitat treatments could decrease project costs, providing more opportunities for oil shale and tar sands development projects to move forward in PHMA and former GHMA.

Alternative 3

Rangewide Environmental Consequences

Colorado, Idaho, Utah, and Wyoming contain significant oil shale resources overlapping the planning area. Colorado, Idaho, and Wyoming manage these resources as fluid leasable minerals so management and

impacts would be same as described in under Fluid Minerals Alternative 2 in **Section 4.10.1**, above. Management and impacts in Utah are described below. Tar sands resources overlapping the planning area only exist in Utah, management and impacts on tar sands in Utah are described below.

In Utah, the BLM anticipates differing effects for this oil shale and tar sands. See the Utah Environmental Consequences for oil shale and tar sands.

Utah Environmental Consequences

Under Alternative 3, disturbance in PHMA would be subject to a 3% cap, which would include wildfire. Approximately 2,320 acres of the White River Oil Shale Preference Right Lease Area and all 2,120 acres of the pending federal lease within the Asphalt Ridge Special Tar Sands Area would be in PHMA. The Uintah Population Area, where the White River Oil Shale Preference Right Lease Area is located, is currently just under the 3% disturbance cap. New development could push the area over the cap and prevent new surface disturbance in this portion of the Preference Right Lease Area until areas are reclaimed to the point where disturbance is below the threshold. All BLM-administered surface in PHMA would be managed as exclusion under Alternative 3. There could be indirect impacts resulting from the limits on access and the available means for transporting oil shale and tar sands to processing facilities and markets.

Alternatives 4 and 5

Rangewide Environmental Consequences

Under Alternatives 4 and 5, proposed management and impacts on oil shale and tar sands development would be the same as described under Alternative 1.

Alternative 6

Rangewide Environmental Consequences

Under Alternative 6, proposed management and impacts on oil shale and tar sands development would be the same as described under Alternative 1, except that ACECs would also be considered under this alternative. Under Alternative 6, ACECs would have NSO stipulations applied to leases which could increase the costs of development or prevent the development of some oil shale and tar sands in the planning area.

10.11 SPECIAL DESIGNATIONS

10.11.1 Greater Sage-Grouse ACECs and Key RNAs in Oregon

Impacts of the alternatives on the ACECs proposed for designation under Alternatives 3 and 6 are described in detail in **Appendix 5**, Areas of Critical Environmental Concern for Greater Sage-grouse. Impacts on key RNAs in Oregon are addressed in **Appendix 17**, Proposed RMP Amendment and Analysis for Key Research Natural Areas in Oregon. 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. The exception to this is in the High Lakes ACEC in Oregon which would receive PHMA with limited exceptions management direction under the Proposed RMP Amendment. The effects of the alternatives and the Proposed RMP Amendment on the High Lakes ACEC are described in **Appendix 5**, Areas of Critical Environmental Concern for Greater Sage-grouse.

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 types of actions that can result in these impacts are discussed in more detail in **Section 4.12.1**, Nature and Type of Effects. 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 projects 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 the 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 the 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 AMLs 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 analyses are required prior to implementation of development activities to determine if and where any disproportionate adverse impacts occur for specific identified environmental justice populations.

10.12.2 Alternative 1

Fluid Minerals (Oil and Gas) Management

Range Wide Environmental Consequences

On annual average, oil and gas production revenue and well development expenditures in the analysis areas is expected to result in a range of about 62,000 to 83,000 total jobs (from 23,000 to 29,000 direct jobs in the drilling oil and gas wells sector and the oil and gas extraction sector), $4.9 billion to $6.7 billion in total labor income (from $2.4 billion to $3.2 billion in direct labor income), and about $26.2 billion to $32.8 billion in economic output (from $18.6 billion to $22.4 billion in direct economic output) combined across 8 states.[2]

A summary of the direct and total average annual number of jobs, labor income, and total economic output that could be supported by projected oil and gas development from 2023 to 2042, under Alternative 1, is provided in **Table 1**, below. **Section 18.4** of **Appendix 18**, Social and Economic Impact and Analysis Methodology and State-Specific Impact Analysis, provides details of the direct and indirect and induced contributions for the analysis area counties combined as well as each state combined, as well as a discussion on the impacts on economic and social conditions for each state in the analysis area with reasonably foreseeable development of oil and gas.

[2] California and Oregon did not have reasonably foreseeable future oil and gas development in the planning area, so they are not included in the discussion.

Table 1. Average Annual Economic Contributions from Oil and Gas, Under Alternative 1

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Colorado (Low Scenario)	Direct	6,574	6,574	790,898,405	790,898,405	3,979,134,548	3,979,134,548
	Total	18,075	22,265	1,487,365,930	1,888,650,265	6,113,421,790	7,023,096,354
Colorado (High Scenario)	Direct	12,791	12,791	1,539,179,946	1,539,179,946	7,738,174,737	7,738,174,737
	Total	35,158	43,301	2,893,316,242	3,672,980,648	11,888,699,355	13,657,026,287
Idaho	Direct	6	6	360,003	360,003	1,873,754	1,873,754
	Total	13	14	705,095	759,269	3,044,425	3,236,789
Montana	Direct	1,922	1,922	284,762,972	284,762,972	1,318,085,631	1,318,085,631
	Total	5,046	5,299	467,912,653	484,846,192	1,893,586,767	1,939,453,416
Nevada	Direct	18	18	249,165	249,165	6,374,761	6,374,761
	Total	41	42	2,133,031	2,182,516	11,445,990	11,681,292
North Dakota	Direct	275	275	31,990,856	31,990,856	406,307,567	406,307,567
	Total	551	573	46,571,864	47,955,782	466,716,295	471,407,239
South Dakota	Direct	89	89	7,090,932	7,090,932	34,541,446	34,541,446
	Total	238	264	14,081,147	15,735,559	61,206,393	66,872,391
Utah	Direct	2,368	2,368	162,438,183	162,438,183	1,619,804,067	1,619,804,067
	Total	5,204	7,059	309,658,031	453,626,368	2,125,280,538	2,450,509,848
Wyoming	Direct	11,727	11,727	1,149,445,274	1,149,445,274	11,250,865,363	11,250,865,363
	Total	26,295	26,318	2,018,370,210	2,019,972,754	14,191,130,372	14,196,131,963
Total Planning Area (Low Colorado Scenario)	Direct	22,980	22,980	2,427,235,790	2,427,235,790	18,616,987,138	18,616,987,138
	Total	55,464	61,833	4,346,797,961	4,913,728,705	24,865,832,571	26,162,389,294
Total Planning Area (High Colorado Scenario)	Direct	29,197	29,197	3,175,517,331	3,175,517,331	22,376,027,327	22,376,027,327
	Total	72,547	82,870	5,752,748,273	6,698,059,088	30,641,110,135	32,796,319,226

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] There were no oil and gas developments projected for California and Oregon.

[2] Total impacts include direct, indirect, and induced impacts.

Fiscal revenue is generated on the production of federal minerals at the federal, state, and in some states at the local level. Many western states and local governments are heavily dependent upon these mineral revenues for a significant portion of their annual budgets. For all states in the planning area, BLM decisions on GRSG HMAs, under Alternative 1, are not expected to change tax revenue and public services from current conditions. The total royalty revenue generated from oil and gas production, combined across 8 states, could range from $2.4 billion to $2.8 billion. Oil and gas activity will continue to support revenue from rents and bonus bids, across all states in the analysis area with reasonably foreseeable future oil and gas development. State severance tax revenue could range from about $723 million to $752 million, across 8 states, combined. Local ad valorem taxes could generate a range of about $759 million to $871 million in county revenues, across 3 states with reasonably foreseeable development of oil and gas and that collect ad

valorem taxes, combine. Additionally, revenue from other state-specific fees and taxes, such as Colorado's oil and gas conservation fee, Montana's privilege and license tax, Nevada's Net Proceeds of Minerals Tax, North Dakota's oil extraction tax, Utah's conservation fee, and Wyoming's oil and gas conservation tax, would range from about $25 million to $28 million, consistent with current conditions. Oil and gas activity would also continue to support revenue to state and local governments through sales and use taxes, across all states in the analysis area with reasonably foreseeable future oil and gas development. A quantitative discussion on royalty and state tax revenues for each state is included in **Appendix 18**. For all states in the planning area, BLM decisions on GRSG HMAs, under Alternative 1, are not expected to change social and nonmarket values and conditions such as lifestyles and culture of those communities of interest that value mineral extraction from current conditions.

Under Alternative 1, in most of the planning area PHMA (IHMA in Idaho) fluid mineral leasing would continue to be managed as NSO, except as noted under the state-specific discussion in Appendix 18, for certain areas in Wyoming and GHMA in Idaho, Nevada, and Utah. In the areas managed as NSO, emissions sources and surface disturbing activities would continue to be eliminated, which would reduce impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and visitor and viewer enjoyment from changes in air quality. Fluid mineral development will likely continue in other locations, which would lead to relocation of impacts on the nonmarket and social conditions associated with air quality and GHG emissions.

See **Appendix 18**, Social and Economic Impact Analysis Methodology and State-Specific Impact Analysis, for additional details of impacts for each state in the analysis area with reasonably foreseeable future oil and gas development in the planning area.

Nonenergy Leasable Minerals Management

Under Alternative 1, most of the PHMA and IHMA in the planning area are closed to new leasing of nonenergy leasable minerals but states can consider expansion of existing leases. Across all states in the planning area, there would continue to be economic activity and nonmarket and social values associated with the extraction of federal nonenergy leasable minerals. There could be economic and social impacts, as detailed in **Section 4.2.1**, *Nature and Type of Effects*, due to current BLM decisions regarding access to nonenergy leasable mineral extractions in certain locations, such as Wyoming, where nonenergy leasable minerals are important to the local economies. It is not anticipated that these impacts would be large due to the adaptive management and allowing the Known Sodium Leasing Area to remain open to exploration and consideration for leasing development.

Locatable Minerals Management

Under the 2015 ROD, carried forward as Alternative 1, all states recommended the withdrawal of all SFAs from locatable mineral entry. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. In 2015, the Secretary proposed to withdraw the SFA lands and a separate process to consider this withdrawal is currently underway. If The Secretary decided to withdraw these lands, there could be impacts on economic activity and social conditions, as discussed in *Nature and Types of Effects*. There could be a decrease in jobs, labor income, and economic output due to the potential decrease in exploration and development. Potential for impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality from locatable mineral development would continue in all GHMA and PHMA (IHMA in Idaho), except in all SFAs.

Mineral Materials Management

Under Alternative 1, except in Idaho, as discussed below, PHMA in all other states 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, which would lead to continued impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality. Extraction could also 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 social conditions associated with mineral materials is likely to be minimal, under Alternative 1.

Idaho

Under Alternative 1, all PHMA would be closed to mineral material disposal except for the expansion of existing pits, unlike other states, in Idaho this closure extends to new free use permits. Closing PHMA to new free use permits would result in increased costs to local government road departments for road maintenance and could result in worsening road conditions in these areas.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

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).[3]

A summary of impacts on the number of jobs, labor income, and economic output from expenditures on geothermal development for each state in the planning area is included in **Table 2**, below. Details on the direct, indirect, and induced economic contributions as well as a discussion on the impacts on economic and social conditions for each state in the analysis with reasonably foreseeable development of oil and gas are included in **Appendix 18**.

For the 7 states in the planning area that are anticipated to see geothermal development, BLM-management decisions on GRSG HMAs, under Alternative 1, are not expected to change tax revenue and public services from current conditions.

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 12**, Reasonably Foreseeable Development Scenario, for more detail). These BLM decisions could result in operators relocating development of wind and solar facilities to other locations that are not restricted. If there are constraints on transmission in nearby areas, relocating wind and solar operations might be costly or it might not be possible, because ROW avoidance and exclusion areas would restrict transmission lines as well as renewable energy development. This could result in barriers to development, which could result in impacts on economic contributions of wind and solar. These impacts would more likely occur in Nevada, Oregon, Utah, and Wyoming, where there have been the most wind and solar developed on federal lands. There are various factors that operators use when deciding where to site wind and solar projects that prevent further analysis on state-level impacts on the level of solar and wind development and associated impacts on economic output due to BLM decisions (see **Section 4.9**).

[3] The RFD does not anticipate future geothermal development in Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas.

Table 2. Average Annual Economic Contributions from Geothermal, Under Alternative 1

State[1]	Type of Impact[2]	Employment	Labor Income	Economic Output
California and Nevada Combined	Direct	276	17,088,024	24,364,445
	Total	540	35,982,758	106,272,068
Colorado	Direct	8	536,971	761,363
	Total	16	1,057,306	2,658,444
Idaho	Direct	22	1,020,547	1,413,689
	Total	36	1,795,032	4,930,353
Oregon	Direct	6	297,479	402,124
	Total	11	576,996	1,509,272
Utah	Direct	12	742,958	1,059,324
	Total	22	1,349,977	3,599,534
Wyoming	Direct	6	288,314	388,376
	Total	9	432,268	1,286,669
Total Planning Area	Direct	330	19,974,293	28,389,321
	Total	634	41,194,337	120,256,340

Source: National Renewable Energy Laboratory 2016
[1]There were no geothermal power plant developments projected for Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas under all alternatives.
[2] Total impacts include direct, indirect, and induced impacts.

Details for impacts on economic and social conditions due to BLM decisions on renewable energy, including geothermal, wind, and solar energy, for each state are included in **Appendix 18**.

Livestock Grazing Management

Rangewide Environmental Consequences

Table 18-7, in **Appendix 18**, shows the average annual number of jobs, labor income, and total economic output that could be supported from projected billed AUMs (total for cattle and sheep), under Alternative 1, for the analysis area counties combined as well as each state combined. On annual average, livestock grazing on allotments where PHMA accounted for at least 15% of the acreage in the analysis areas for all states combined is expected to support 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) across all states in the planning area.

Under Alternative 1, PHMA, IHMA, and GHMA would continue to be available for livestock grazing, which would continue to support current levels of economic and social conditions. BLM decisions on GRSG HMAs, under Alternative 1, are not expected to impact social conditions such as lifestyles and culture of ranchers and farmers and those communities of interest that value livestock grazing on public lands, as those impacts described in the *Nature and Types of Effects* (see **Section 4.8**, Livestock Grazing).

A summary of total and direct impacts on the number of jobs, labor income, and economic output from expenditures on livestock grazing for each state in the planning area is included in **Table 3**, below. Details on the direct, indirect, and induced economic contributions as well as a discussion on impacts on economic and social conditions for each state are included in in **Appendix 18**.

Table 3. Average Annual Economic Contributions from Livestock Grazing in Allotments where PHMA Accounted for 15% or More of the Acreage, Under Alternative 1

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
California	Direct	7	7	2,146,636	2,146,636	4,625,897	4,625,897
	Total	19	22	3,105,261	3,386,449	7,436,887	8,391,031
Colorado	Direct	50	50	1,844,864	1,844,864	5,164,123	5,164,123
	Total	78	82	2,995,610	3,200,447	9,046,152	9,841,613
Idaho	Direct	77	77	13,312,954	13,312,954	28,474,475	28,474,475
	Total	214	221	22,450,229	22,805,297	55,796,422	57,280,261
Montana	Direct	186	186	10,506,213	10,506,213	33,185,106	33,185,106
	Total	364	381	20,177,827	20,978,060	64,895,970	67,265,732
Nevada	Direct	82	82	13,703,178	13,703,178	42,086,589	42,086,589
	Total	230	236	23,293,363	23,567,530	74,802,986	76,657,180
North Dakota	Direct	1	1	39,141	39,141	143,402	143,402
	Total	1	1	62,321	64,077	228,340	235,019
Oregon	Direct	78	78	6,451,505	6,451,505	25,184,996	25,184,996
	Total	197	206	13,466,487	14,139,416	47,731,985	50,012,006
South Dakota	Direct	5	5	185,898	185,898	1,405,882	1,405,882
	Total	10	10	373,256	402,461	2,335,006	2,458,076
Utah	Direct	54	54	4,634,026	4,634,026	10,839,099	10,839,099
	Total	87	90	6,083,969	6,218,740	16,268,163	16,915,273
Wyoming	Direct	301	301	14,742,131	14,742,131	52,633,690	52,633,690
	Total	547	552	24,819,572	25,059,882	90,295,946	91,280,444
Total Planning Area	Direct	841	841	67,566,546	67,566,546	203,743,259	203,743,259
	Total	1,747	1,801	116,827,895	119,822,359	368,837,857	380,336,635

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.
[1] Total impacts include direct, indirect, and induced impacts.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Management under Alternative 1 to conserve, enhance, and restore sagebrush ecosystems by separating GRSG habitat into SFAs, PHMAs, IHMAs, and GHMAs, would provide protection for GRSG conservation values. BLM decisions would continue to support nonmarket values associated with GRSG conservation, which would especially impact habitat conservation communities of interest (see discussion in *Nature and Type of Effects* and **Section 3.11**, Social and Economic Conditions).

Under Alternative 1, BLM decisions would support the protection of GRSG ecosystems, which would continue to provide value to the surrounding communities through impacts on tribal interests and cultural resources, especially subsistence, from changes in GRSG populations. Habitat conservation could also result in impacts to communities who would benefit from development. Some examples include impacts to road realignment projects near tribal reservations and plans to expand reservation boundaries if the reservation is surrounded by PHMA.

Environmental Justice

Rangewide Environmental Consequences

Under Alternative 1, cultural resources could be impacted by BLM decisions by allowing surface disturbing activities. These impacts on cultural resources would result in disproportionate and adverse impacts on American Indian and Alaska Native populations who value and use these resources. These impacts could occur across all states in the planning area where there are cultural resources and where there are identified environmental justice populations, such as in Colorado, where there are known concentrations of archaeological resources in pinyon-juniper vegetation that provide value to American Indian and Alaska Native populations, and in California and Nevada, where there are traditional pine nutting areas that are valuable to American Indian and Alaska Native populations. Project-specific Section 106 compliance and government-to-government consultation with tribes should mitigate the effects of development on BLM-administered lands outside of sagebrush-dominated areas. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Under Alternative 1, surface-disturbing activities could negatively impact subsistence resource availability. This would likely disproportionately impact environmental justice populations due to the importance of subsistence activities to American Indian and Alaska Native populations, low-income populations, and some minority populations. The disturbance cap, under Alternative 1, could help to reduce the impacts to wildlife and subsistence resources, which could reduce impacts on environmental justice populations. These impacts would occur across the planning area. Level of impact would likely vary geographically depending on the level of subsistence use in the region and the location of surface disturbance; a site-specific analysis would be needed to further analyze the impacts. See **Section 4.5**, Fish and Wildlife and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Under Alternative 1, in most of the planning area PHMA (IHMA in Idaho), except as noted in **Table 4**, below, and discussed under the state-specific subheadings in **Appendix 18** for Idaho, Nevada, Oregon, Utah, and Wyoming, current stipulations and BLM decisions would continue and would likely reduce the impacts on GHG emissions and air quality from particulate matter, risk of wildfire smoke, and surface-disturbing activities. Mineral development will likely continue in other locations, which would lead to relocation of impacts on the nonmarket and social conditions associated with air quality, such as access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment. The impacts on air quality would affect all communities, including environmental justice populations, and the extent to which these impacts would disproportionately affect environmental justice populations would depend on site-specific factors and would require a site-specific analysis. See **Section 4.13**. Air Resources and Climate.

Impacts from BLM-management decisions on environmental justice populations vary by geographic region. Many impacts would require site-specific analyses to determine if BLM decisions would result in disproportionate and adverse impacts on environmental justice populations at a local level. For the purposes of this rangewide EIS, a summary of the number of counties in the analysis area, the number of counties that meet a criteria for containing environmental justice population, and a summary of impacts by state is included in **Table 4**, below, and a more detailed discussion of adverse and disproportionate impacts on environmental justice populations by state is included in **Appendix 18**.[4]

[4] There were no counties in the North Dakota analysis area that met the threshold for environmental justice populations, so North Dakota is not included in the state-by-state discussion.

Table 4. Impacts on Environmental Justice Populations by State, Under Alternative 1

State	Number of Counties in the Analysis Area	Number of Counties that with Populations that meet the Environmental Justice Criteria	Summary of Impacts[1]
California	2	2	Disproportionate and adverse impacts on environmental justice populations could occur from changes in access to subsistence resources.
Colorado	8	7	Disproportionate and adverse impacts on environmental justice populations could occur from changes in access to cultural and subsistence resources.
Idaho	27	25	Same as Colorado. Additionally, disproportionate and adverse impacts on environmental justice populations could occur due to continued impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality if there would be an increase in mineral and ROW development and activities in GHMA and IHMA.
Montana	26	18	Same as Colorado.
Nevada	10	10	Similar to Idaho, except disproportionate and adverse impacts could occur if there would be an increase in mineral and ROW development activities in PHMA and GHMA.
Oregon	8	7	Similar to Idaho, except disproportionate and adverse impacts could occur if there would be an increase in mineral and ROW development activities in PHMA, where only utility-scale wind and solar projects would be excluded.
South Dakota	2	1	Same as California.
Utah	23	18	Same as Nevada.
Wyoming	21	15	Same as Nevada.

Source: US Environmental Protection Agency 2023; US Census Bureau 2023

[1] See Appendix 18 for more details on impacts by state.

10.12.3 Alternative 2

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

The number of wells anticipated to be drilled and completed over the planning period would be the same as under Alternative 1 in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming, so the market impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 1 for these states (see **Table 5**, below). Under Alternative 2, oil and gas production revenue and well development expenditures are expected to increase in Colorado and Idaho due to BLM-management decisions (see **Section 4.10**, Mineral Resources). On annual average,

this increase is expected to support about 325 more jobs (almost 100 additional direct jobs), about $27 million more in total labor income (about $11.5 million in additional direct labor income), and about $100 million in additional economic output (about $60 million in additional direct economic output) than under Alternative 1, across these two states. Additional details for state-specific direct, indirect, and induced impacts are included in **Appendix 18**.

Table 5. Average Annual Economic Contributions from Oil and Gas, Under Alternative 2

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Colorado (Low Scenario)	Direct	6,669	6,669	802,283,755	802,283,755	4,036,412,178	4,036,412,178
	Total	18,335	22,585	1,508,776,391	1,915,837,404	6,201,421,407	7,124,192,537
Colorado (High Scenario)	Direct	12,885	12,885	1,550,426,755	1,550,426,755	7,794,700,978	7,794,700,978
	Total	35,415	43,617	2,914,454,009	3,699,811,501	11,975,544,580	13,756,786,294
Idaho	Direct	8	8	480,004	480,004	2,498,339	2,498,339
	Total	17	18	940,127	1,012,359	4,059,233	4,315,719
Montana	Direct	1,922	1,922	284,762,972	284,762,972	1,318,085,631	1,318,085,631
	Total	5,046	5,299	467,912,653	484,846,192	1,893,586,767	1,939,453,416
Nevada	Direct	18	18	249,165	249,165	6,374,761	6,374,761
	Total	41	42	2,133,031	2,182,516	11,445,990	11,681,292
North Dakota	Direct	275	275	31,990,856	31,990,856	406,307,567	406,307,567
	Total	551	573	46,571,864	47,955,782	466,716,295	471,407,239
South Dakota	Direct	89	89	7,090,932	7,090,932	34,541,446	34,541,446
	Total	238	264	14,081,147	15,735,559	61,206,393	66,872,391
Utah	Direct	2,368	2,368	162,438,183	162,438,183	1,619,804,067	1,619,804,067
	Total	5,204	7,059	309,658,031	453,626,368	2,125,280,538	2,450,509,848
Wyoming	Direct	11,727	11,727	1,149,445,274	1,149,445,274	11,250,865,363	11,250,865,363
	Total	26,295	26,318	2,018,370,210	2,019,972,754	14,191,130,372	14,196,131,963
Total Planning Area (Low Colorado Scenario)	Direct	23,077	23,077	2,438,741,141	2,438,741,141	18,674,889,353	18,674,889,353
	Total	55,728	62,158	4,368,443,454	4,941,168,934	24,954,846,996	26,264,564,407
Total Planning Area (High Colorado Scenario)	Direct	29,293	29,293	3,186,884,142	3,186,884,142	22,433,178,152	22,433,178,152
	Total	72,808	83,191	5,774,121,072	6,725,143,031	30,728,970,169	32,897,158,163

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] There were no oil and gas developments projected for California and Oregon.

[2] Total impacts include direct, indirect, and induced impacts.

Mineral development would continue to support federal, state, and local mineral revenues at levels similar to those estimated under Alternative 1, except for impacts in Colorado and Idaho, as described in Appendix 18, which could result in an increase in federal, state, and local revenues, compared with Alternative 1. Changes in mineral revenues available to fund public services and infrastructure in Montana, Nevada, North

Dakota, South Dakota, Utah, and Wyoming would be negligible relative to those under Alternative 1. Across all states in the planning area, compared with Alternative 1, there could be an additional $6.4 to $6.5 million in royalty revenue, $500,000 in state severance tax revenue, $1.7 million in ad valorem tax revenue, and $40,000 in oil and gas conservation fee revenue. Changes in oil and gas activity could lead to an increase in revenue from rents and bonus bids, compared with Alternative 1. Additionally, an increase in oil and gas activity would likely lead to more direct and indirect spending, which would lead to an increase in sales and use tax, compared with Alternative 1.

Under Alternative 2, impacts on nonmarket and social conditions such as impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality would be the same as under Alternative 1, except in Colorado as described in **Appendix 18**. Social values in terms of way-of-life, culture, and social cohesion for the communities who value mineral extraction in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming would be similar to those described under Alternative 1.

See **Appendix 18** for additional detail of state-level impacts for Colorado and Idaho.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 2, economic and social impacts from changes in nonenergy leasable minerals due to BLM-management decisions would be the same as under Alternative 1 for all states in the planning area, except Nevada.

Nevada

Nevada added exception criteria to the closure in PHMA, allowing leasing of nonenergy leasable minerals under certain circumstances. This would improve the access of nonenergy leasable minerals in the planning areas compared to Alternative 1, which could improve economic and social conditions associated with nonenergy leasable minerals, such as lifestyle, culture, employment, and economic output, through greater extraction of these mineral resources. However, BLM-management decisions under Alternative 2 could also lead to less access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality.

Locatable Minerals Management

Rangewide Environmental Consequences

Except for Montana, where recommendation for withdrawal of SFAs language would be as described under Alternative 1, Alternative 2 does not include recommendations for the withdrawal of SFAs from locatable mineral entry. Recommendations for withdrawal have no impact on economic activity.

Under Alternative 2, removing the recommendation for withdrawal of locatable mineral entry in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment) would not change impacts on nonmarket and social conditions from changes in air quality and GHG emissions because as discussed under Alternative 1, enacting the recommendation would be separate action and not occur under this RMPA.

Mineral Materials Management

Rangewide Environmental Consequences

Under Alternative 2, impacts on public access to mineral materials and social and nonmarket values associated with mineral material extraction would likely be similar to under Alternative 1, for all states except for Idaho and Nevada.

Under Alternative 2, impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from proposed management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal in PHMA and GHMA would be the same as under Alternative 1, except in Idaho IHMA and Nevada PHMA as described in the state-specific sub-headings below.

Idaho

Under Alternative 2, PHMA and IHMA would be managed as closed to mineral material sales, however, Idaho would allow consideration of new free use permits. Compared to Alternative 1, this would 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, allowing consideration of new free use permits for saleable minerals in Idaho IHMA, would increase the potential for associated impacts on nonmarket and social conditions due to changes in air quality and GHG emissions compared with Alternative 1. This is because there would be a greater chance for more acres of saleable mineral activities to occur in these areas.

Nevada

Under Alternative 2, Nevada would allow exception criteria to the mineral material disposal closure in PHMA. These criteria could increase the time to get approval for new mineral material sales but would also provide certainty about the conditions under which exemptions would be granted and would reduce social and economic impacts associated with sourcing mineral materials from alternative locations.

Under Alternative 2, adding an exception criterion to saleable and nonenergy mineral closures for Nevada PHMA would increase the potential for associated impacts on nonmarket and social conditions due to changes in air quality and GHG emissions. This is because there would be a greater chance for more area of saleable mineral activities to occur in these areas.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

The number of geothermal plants developed, under Alternative 2, would be the same as those anticipated under Alternative 1 in all states (see **Appendix 12**, Reasonably Foreseeable Development Scenario), so the impacts on economic activity in terms of jobs, labor, income, economic output from future geothermal development would also be the same as those described under Alternative 1 (see **Table 6**, below for a summary of direct and total impacts, and **Table 18-9** in **Appendix 18**, for details on direct, indirect, and induced impacts).

Under Alternative 2, BLM decisions related to ROWs for wind and solar energy would be the same as Alternative 1 for all states, except for Nevada, Utah, and Wyoming). While BLM decisions vary slightly in Nevada, Utah, and Wyoming, the impacts of these decisions on ROWs for wind and solar energy would be minimal due to the projected small change in restricted acres in Nevada and Wyoming and the greater flexibility for infrastructure projects in Utah compared to Alternative 1. This means that for all states, economic contributions from wind and solar energy development would be similar to those under Alternative 1.

Table 6. Average Annual Economic Contributions from Geothermal, Under Alternative 2

State[1]	Type of Impact[2]	Employment	Labor Income	Economic Output
California and Nevada Combined	Direct	276	17,088,024	24,364,445
	Total	540	35,982,758	106,272,068
Colorado	Direct	8	536,971	761,363
	Total	16	1,057,306	2,658,444
Idaho	Direct	22	1,020,547	1,413,689
	Total	36	1,795,032	4,930,353
Oregon	Direct	6	297,479	402,124
	Total	11	576,996	1,509,272
Utah	Direct	12	742,958	1,059,324
	Total	22	1,349,977	3,599,534
Wyoming	Direct	6	288,314	388,376
	Total	9	432,268	1,286,669
Total Planning Area	Direct	330	19,974,293	28,389,321
	Total	634	41,194,337	120,256,340

Source: National Renewable Energy Laboratory 2016
[1]There were no geothermal power plant developments projected for Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas under all alternatives.
[2] Total impacts include direct, indirect, and induced impacts.

Under Alternative 2, impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from changes in GRSG habitat protected from major and minor ROWs and from solar and wind development would be the same as under Alternative 1, except in Nevada for solar energy development and major ROWs, and in Nevada and Utah for wind energy development, as described in the state-specific analysis in **Appendix 18**.

Details for impacts on economic and social conditions due to BLM decisions on renewable energy, including geothermal, wind, and solar energy, by state are included in **Appendix 18**.

Livestock Grazing Management

Rangewide Environmental Consequences

Estimated billed AUMs, under Alternative 2, would be the same as under Alternative 1 for all states and analysis areas, so impacts on economic activity in terms of jobs and income from livestock grazing would also be the same as described under Alternative 1 (see **Table 7**, below, for a summary of direct and total impacts by state, and see **Table 18-10** in **Appendix 18** for direct, indirect, and induced impacts by state). In addition, social impacts in terms of way-of-life, culture, and social cohesion would be similar to those described under Alternative 1.

Impacts on livestock grazing operations and associated non-market values would be similar to those described for Alternative 1.

Table 7. Average Annual Economic Contributions from Livestock Grazing in Allotments where PHMA Accounted for 15% or More of the Acreage, Under Alternative 2

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
California	Direct	7	7	2,146,636	2,146,636	4,625,897	4,625,897
	Total	19	22	3,105,261	3,386,449	7,436,887	8,391,031
Colorado	Direct	50	50	1,844,864	1,844,864	5,164,123	5,164,123
	Total	78	82	2,995,610	3,200,447	9,046,152	9,841,613
Idaho	Direct	77	77	13,312,954	13,312,954	28,474,475	28,474,475
	Total	214	221	22,450,229	22,805,297	55,796,422	57,280,261
Montana	Direct	186	186	10,506,213	10,506,213	33,185,106	33,185,106
	Total	364	381	20,177,827	20,978,060	64,895,970	67,265,732
Nevada	Direct	82	82	13,703,178	13,703,178	42,086,589	42,086,589
	Total	230	236	23,293,363	23,567,530	74,802,986	76,657,180
North Dakota	Direct	1	1	39,141	39,141	143,402	143,402
	Total	1	1	62,321	64,077	228,340	235,019
Oregon	Direct	78	78	6,451,505	6,451,505	25,184,996	25,184,996
	Total	197	206	13,466,487	14,139,416	47,731,985	50,012,006
South Dakota	Direct	5	5	185,898	185,898	1,405,882	1,405,882
	Total	10	10	373,256	402,461	2,335,006	2,458,076
Utah	Direct	54	54	4,634,026	4,634,026	10,839,099	10,839,099
	Total	87	90	6,083,969	6,218,740	16,268,163	16,915,273
Wyoming	Direct	301	301	14,742,131	14,742,131	52,633,690	52,633,690
	Total	547	552	24,819,572	25,059,882	90,295,946	91,280,444
Total Planning Area	Direct	841	841	67,566,546	67,566,546	203,743,259	203,743,259
	Total	1,747	1,801	116,827,895	119,822,359	368,837,857	380,336,635

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] Total impacts include direct, indirect, and induced impacts.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Management under Alternative 2 to conserve, enhance, and restore sagebrush ecosystems would have similar impacts on nonmarket and social values of GRSG as those described in Alternative 1. Nonmarket impacts under Alternative 2 would be similar to those described in Alternative 1, with state analysis area specific differences. For GRSG conservation related values, removing SFAs in UT, WY, NV, and ID would reduce protections from development and provide fewer safeguards for nonmarket values associated with self-sustaining populations of GRSG.

Requirements for mitigation that achieves a net conservation gain in all HMA types in MT/DK, NV/CA, and OR, and impacts would be the same as described for Alternative 1. Enforcement of mitigation resulting in no net loss in HMA CO and ID would increase potential impacts to non-market values such as the nonuse values of preserving the species for future generations compared to the net-conservation gain requirements under Alternative 1. In UT and WY, the net conservation gain requirement would be removed, which would increase potential for impacts to conservation related values. Voluntary implementation of compensatory mitigation in CO, ID, NV/CA, OR, UT, and WY HMA, could also increase the potential for impacts on nonmarket values associated with GRSG preservation compared to Alternative 1.

Environmental Justice

Rangewide Environmental Consequences

Impacts on cultural resources under Alternative 2 would be similar to under Alternative 1, except as noted in **Table 8** below for Colorado, Idaho, Nevada, Utah, and Wyoming. **Table 8**, below, provides a summary of the number of counties in the analysis area, the number of counties that meet a criteria for containing environmental justice population, and a summary of impacts by state, and a more detailed discussion of adverse and disproportionate impacts on environmental justice populations by state is included in **Appendix 18**. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Table 8. Impacts on Environmental Justice Populations by State, Under Alternative 2

State	Number of Counties in the Analysis Area	Number of Counties that with Populations that meet the Environmental Justice Criteria	Summary of Impacts[1]
Colorado	8	7	Disproportionate and adverse impacts on environmental justice populations could occur from changes in access to cultural resources, due to exposure of PHMAs to potential fluid mineral leasing. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts as well as methods for avoiding, minimizing, and/or compensating for identified impacts. Additionally, disproportionate and adverse impacts on environmental justice populations could occur due to potential impacts on access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, compared with Alternative 1.
Idaho	27	25	Similar to Colorado, except the disproportionate and adverse impacts on environmental justice populations could occur from removing SFAs and allowing consideration of new free us permits for saleable minerals. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts as well as methods for avoiding, minimizing, and/or compensating for identified impacts.
Nevada	10	10	Same as Idaho.
Utah	23	18	Same as Idaho. Additionally, disproportionate and adverse impacts on environmental justice populations could occur in areas outside PHMAs that are within 5 miles of leks, which would be avoidance for wind development, due to the potential for impacts on nonmarket and social conditions due to changes in air quality and GHG emissions compared with Alternative 1.
Wyoming	21	15	Same as Idaho. There are protections in place for cultural resources within existing RMPs that would mitigate impacts on environmental justice populations. Future site-specific implementation analysis would be needed to determine the level and intensity of impacts.

Source: US Environmental Protection Agency 2023; US Census Bureau 2023

[1] See Appendix 18 for more details on impacts by state.

Under Alternative 2, impacts on subsistence resources would be similar to those under Alternative 1, except for areas with fewer restrictions on fluid mineral development, and/or more allocable permits for saleable minerals, where subsistence resources would likely be more at risk due to surface disturbance. Impacts on subsistence resources could disproportionately impact environmental justice populations. The extent to which the impacts on subsistence affects environmental justice populations depends on site-specific factors and analysis. See **Section 4.5**, Fish and Wildlife and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Under Alternative 2, impacts on air quality and GHG emissions would be the same as under Alternative 1, except as noted under the state-specific subheadings below for Colorado, Idaho, Nevada, and Utah. Impacts on air quality from risks of wildfire smoke and fugitive dust, under Alternative 2, would be the same as under Alternative 1. See **Section 4.13**, Air Resources and Climate.

10.12.4 Alternative 3

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

On annual average, oil and gas production revenue and well development expenditures in the analysis area for 8 states combined is expected to result in about 17,000 to 29,000 fewer total jobs (about 7,000 to 11,000 fewer direct jobs), about $1.3 billion to $2.3 billion less in total labor income (about $746 million to $1.1 billion less in direct labor income), and about $8.0 billion to $11.6 billion less in economic output (about $6.1 billion to $8.1 billion less in direct economic output) than under Alternative 1. The large changes in economic conditions, under Alternative 3, could lead to higher levels of unemployment and underemployment in some mineral dependent economies. Displaced workers in more diversified economies are likely to have an easier time finding new employment while rural residents may have to commute further for work or may have to consider re-locating out of the area. Those lacking financial resources to either commute further or relocate will be especially impacted.

A summary of the direct and total average annual number of jobs, labor income, and total economic output that could be supported by projected oil and gas development from 2023 to 2042, under Alternative 3, is provided in **Table 9**, below. **Section 18.4.4** of **Appendix 18**, Social and Economic Impact and Analysis Methodology and State-Specific Impact Analysis, provides details of the direct and indirect and induced contributions for the analysis area counties combined as well as each state combined as well as a discussion on the impacts on economic and social conditions for each state in the analysis area with reasonably foreseeable development of oil and gas.

Table 9. Average Annual Economic Contributions from Oil and Gas, Under Alternative 3

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Colorado (Low Scenario)	Direct	6,263	6,263	755,042,456	755,042,456	3,769,457,803	3,769,457,803
	Total	17,169	21,052	1,413,389,813	1,784,540,707	5,791,291,470	6,632,710,393
Colorado (High Scenario)	Direct	9,122	9,122	1,099,726,614	1,099,726,614	5,488,012,722	5,488,012,722
	Total	24,999	30,651	2,058,115,395	2,598,211,191	8,431,632,887	9,656,427,089
Idaho	Direct	5	5	312,003	312,003	1,623,920	1,623,920
	Total	11	12	611,082	658,033	2,638,502	2,805,218

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Montana	Direct	1,373	1,373	208,532,284	208,532,284	981,019,294	981,019,294
	Total	3,661	3,877	343,504,881	358,265,225	1,402,864,733	1,440,567,225
Nevada	Direct	5	5	75,848	75,848	1,872,389	1,872,389
	Total	12	12	628,603	643,276	3,364,313	3,433,985
North Dakota	Direct	233	233	27,075,375	27,075,375	343,845,594	343,845,594
	Total	467	485	39,416,233	40,587,679	394,972,555	398,943,340
South Dakota	Direct	85	85	6,798,604	6,798,604	32,968,114	32,968,114
	Total	227	252	13,472,426	15,034,497	58,380,452	63,731,498
Utah	Direct	2,122	2,122	145,452,892	145,452,892	1,453,148,321	1,453,148,321
	Total	4,664	6,332	277,459,904	406,910,285	1,906,353,700	2,198,817,217
Wyoming	Direct	5,662	5,662	537,821,720	537,821,720	5,948,302,548	5,948,302,548
	Total	12,702	12,708	971,432,220	971,907,423	7,391,473,976	7,392,957,101
Total Planning Area (Low Colorado Scenario)	Direct	15,748	15,748	1,681,111,182	1,681,111,182	12,532,237,982	12,532,237,982
	Total	38,912	44,730	3,059,915,162	3,578,547,126	16,951,339,701	18,133,965,977
Total Planning Area (High Colorado Scenario)	Direct	18,607	18,607	2,025,795,340	2,025,795,340	14,250,792,901	14,250,792,901
	Total	46,743	54,329	3,704,640,744	4,392,217,610	19,591,681,118	21,157,682,673

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] There were no oil and gas developments projected for California and Oregon.

[2] Total impacts include direct, indirect, and induced impacts.

Management actions that restrict oil and gas development in PHMA would likely adversely affect fiscal revenues. Under Alternative 3, there could be a reduction in federal royalty revenue by a range of $1.1 billion to $1.4 billion, a reduction in state severance tax revenue by $252 million to $269 million, a reduction in local ad valorem tax revenue by $262 million to $324 million, and a reduction in other state taxes and fees by $4.9 million to $6.4 million (including revenue from Colorado's oil and gas conservation fee, Montana's privilege and license tax, Nevada's Net Proceeds of Minerals Tax, North Dakota's oil extraction tax, Utah's conservation fee, and Wyoming's oil and gas conservation tax). Additionally, the reductions in oil and gas activity due to BLM decisions, under Alternative 3, across all states with reasonably foreseeable future oil and gas developments, could lead to a reduction in revenue from rents and bonus bids, compared with Alternative 1. The reduction in oil and gas activity would also likely lead to less direct and indirect spending, which would lead to a decrease in sales and use tax, compared with Alternative 1. The large decrease in fiscal revenues, under Alternative 3, could contribute to future state and local government budget shortfalls, especially in jurisdictions that rely on the taxation of minerals in place of income taxes or where taxes on mineral production currently represent the single largest source of revenue. These budget shortfalls may affect the ability of states and local governments to maintain infrastructure and provide public services at current levels. Insufficient funding for infrastructure and public services would adversely affect quality of life in affected communities and could further limit rural residents' access to educational opportunities, health care, and social safety net programs.

Under Alternative 3, all PHMA would close all areas in PHMA to mineral and ROW development, and would make PHMA unavailable to livestock grazing, which would reduce potential impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from actions such as surface disturbance from mineral development. Due to closing PHMA, the effects on these nonmarket and social conditions would be the lowest out of the alternatives.

BLM decisions to manage all PHMA as closed to leasing could lead to further impacts on economic and social conditions due to potential changes in oil and gas activity on adjacent nonfederal lands and minerals, as described under the *Nature and Types of Effects*. These impacts would likely occur in areas where the BLM-administered lands are not contiguous, and where it is not economical develop the nonfederal minerals due to limitations on expanding operations across federal and nonfederal minerals, or where pipelines and transmission lines are needed on federal lands to access the nonfederal minerals (see Section 4.10.1, Fluid Minerals (Including Geothermal), for more information on impacts on oil and gas activity on nonfederal minerals and land due to BLM decisions on BLM-administered land). Impacts on economic and social conditions due to changes in oil and gas activity on nonfederal lands include are similar to those described above, and could include reductions in jobs, labor income, economic output, tax revenue, and impacts on social cohesion, way of life, and culture for those communities that rely on mineral development for economic opportunities. If there is a reduction in oil and gas activity on state lands due to BLM decisions on nearby federal lands and minerals, there could be impacts on revenue to the state, which could result in budget shortfalls. Budget shortfalls for the states could adversely impact access and quality of public services, such as education, which is funded by revenue collected from mineral production on state trust lands in states across the analysis area.

See **Appendix 18**, Social and Economic Impact Analysis Methodology and State-Specific Impact Analysis, for additional details of impacts for each state in the analysis area with reasonably foreseeable oil and gas development in the planning area.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 3, all PHMA would be closed to new nonenergy mineral leasing, which would result in the economic and social impacts. This closure would result in impacts on economic contributions associated with nonenergy mineral extraction, such as reductions in jobs, labor income, economic output, and tax revenue, compared with 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. There could be impacts from BLM decisions on lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on mineral extraction for employment. These impacts would have a larger effect on communities in northwestern Colorado, in Caribou County, Idaho, central Utah, and southwestern Wyoming, where the local economies have relied on nonenergy leasable mineral extraction on federal estate.

Closures in land to new nonenergy mineral leasing could result in increases in prices in the short term of household products, such as products made from trona due to an increase in cost that would likely occur to mining operators. Restrictions on mineral leasing will likely not result in immediate closures of mines. If restrictions on nonenergy leasing continue in the long term, there could be impacts on the availability of household products made from trona due to the potential continued constraints on nonenergy leasable mineral extractions. Increases in prices and decreases in availability of household products can put large strains on households, especially those with limited resources for alternative products or those with low income, where the products already make up a larger percentage of disposable income. If closures in mines

continue to put pressure on prices and limit availability, it could cause even more stress on the surrounding communities, including increases in conflicts and decreases in social cohesion and health and safety. See **Section 4.10.2**, Nonenergy Leasable Minerals, for more information regarding impacts on trona and other nonenergy leasable minerals due to BLM-Management decisions.

Under Alternative 3, all PHMA would be closed to nonenergy mineral leasing, which would reduce potential impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from actions such as surface disturbance from mineral development, as described under the *Nature and Types of Effects*. Due to closing PHMA, the effects on these nonmarket and social conditions would be the lowest out of the alternatives.

Locatable Minerals Management

Rangewide Environmental Consequences

Under Alternative 3, all lands in PHMA would be recommended for withdrawal from locatable mineral entry. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. However, the BLM could ask the Secretary of the Interior to propose and make a withdrawal of the land from location and entry under the Mining Law of 1872 pursuant to Section 204(a) of FLPMA. Proposing and making a withdrawal is not a land use planning process. Should the Secretary propose a withdrawal, the proposal would require environmental and other analysis under NEPA and other applicable authorities before the land could be withdrawn. For purposes of this planning initiative, the alternatives analysis includes a description of the likely environmental effects should the Secretary propose and make a withdrawal in the future. If the Secretary decided to withdraw the land, such a withdrawal would likely result in a reduction of economic activity in mining sectors, compared with under Alternative 1, as described in the *Nature and Type of Effects*. The reduction in economic activity could result in impacts on market and nonmarket conditions, such as reductions in jobs, labor income, economic output, tax revenue, public services, access to lifestyles and culture associated with mining. For mining operators with existing mining claims that might survive a withdrawal, costs could increase due to the additional requirement to verify mining claim validity before the BLM will approve a notice or plan of operations. These impacts could put strain on communities, especially those that are dependent on the mining industry. These impacts would likely be larger in areas with high potential for locatable mineral development, assuming that there are existing mining claims on those lands as of the date of withdrawal. Such a withdrawal, if made by the Secretary, would not impact nonmarket and social conditions associated with changes in air quality and GHG emissions.

Mineral Materials Management

Rangewide Environmental Consequences

Under Alternative 3, all areas managed for GRSG would be PHMA and would be closed to mineral materials disposal. This would reduce federal, state, territorial, municipality, and non-profit access to mineral materials through free use permits and would increase costs for these users by relocating mineral materials operations to nonpublic lands or to public lands that are further away from where the minerals are going to be used, which would increase transportation costs. The increases in cost of mineral materials extraction could cause delays or cancelations of public projects that use mineral materials, such as road maintenance and construction of infrastructure by states and municipalities. Delays and cancelations in construction and maintenance projects would impact surrounding communities who rely on the roads and infrastructures and could increase public safety concerns and residents' frustration with road construction and repairs. These impacts would likely be larger in areas with high potential for mineral materials extraction. If historical

extraction is an indication of potential, then the analysis areas in Colorado, Idaho, Montana, Nevada, and Wyoming would likely be impacted more by BLM decisions on lands closed to mineral materials disposal.

Under Alternative 3, closing PHMA to mineral materials disposal could reduce potential impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from actions such as surface disturbance, associated with mineral development. However, if mineral materials operations shift to state or private lands due to closing PHMA to mineral materials disposal, then impacts on social conditions and access and quality of nonmarket values would shift to these locations as well and there would be no overall change in impacts on nonmarket and social conditions, compared with Alternative 1.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

Impacts on economic activity from BLM-management decisions that could impact geothermal development, under Alternative 3, are discussed each state with reasonably foreseeable development in **Appendix 18**. Montana, North Dakota, and South Dakota did not have any projected geothermal development in the analysis areas due to the limited geothermal potential. On annual average, across the 7 states with projected geothermal development, geothermal development is expected to result in about 76 fewer total jobs (about 43 fewer direct jobs), $4.3 million less in total 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 (see **Table 10**, below, for a summary of direct and total impacts by state, and see **Appendix 18** for a more detailed discussion of impacts, including direct, indirect, and induced impacts by state).

Table 10. Average Annual Economic Contributions from Geothermal, Under Alternative 3

State[1]	Type of Impact[2]	Employment	Labor Income	Economic Output
California and Nevada Combined	Direct	276	17,088,024	24,364,445
	Total	540	35,982,758	106,272,068
Colorado	Direct	0	0	0
	Total	0	0	0
Idaho	Direct	11	514,407	711,614
	Total	18	902,749	2,476,407
Oregon	Direct	0	0	0
	Total	0	0	0
Utah	Direct	0	0	0
	Total	0	0	0
Wyoming	Direct	0	0	0
	Total	0	0	0
Total Planning Area	Direct	287	17,602,431	25,076,059
	Total	558	36,885,507	108,748,475

Source: National Renewable Energy Laboratory 2016

[1]There were no geothermal power plant developments projected for Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas under all alternatives.

[2] Total impacts include direct, indirect, and induced impacts.

Under Alternative 3, there would be the most restrictions on ROWs for wind and solar development out of all alternatives (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail). These BLM decisions could result in operators relocating development of wind and solar facilities to other

non-federal locations. Relocating wind and solar operations might not be feasible in certain locations due to constraints on transmission line availability, and it could be very costly or not possible to develop transmission lines to the nearby area, because ROW avoidance and exclusion areas would apply to transmission lines as well. If additional lines of transmission are needed, this could result in impacts on economic contributions of wind and solar. Under Alternative 3, impacts on economic conditions may be increased compared to Alternative 1 due to the highest level of restrictions on solar and wind site development. There are many factors that operators consider when siting solar and wind development that are not influenced by BLM-management decisions, including resource potential, electricity prices, business decisions, among others. These factors can vary by site, operator, and technology, so a site-specific analysis would need to be conducted to further understand the economic impacts from changes in wind and solar development due to BLM decisions (see **Section 4.9**, Lands and Realty).

Under Alternative 3, all PHMAs would be managed as exclusion areas for major ROWs and wind or solar energy. Prohibiting development of wind, solar, and other major ROWs would eliminate the likelihood for impacts on nonmarket and social conditions from changes in air quality and GHG emissions from surface-disturbing activities in these areas.

Details for impacts on economic and social conditions due to BLM decisions on renewable energy, including geothermal, wind, and solar energy, by state are included in **Appendix 18**.

Livestock Grazing Management

Rangewide Environmental Consequences

Under Alternative 3, all HMA (PHMA) would be unavailable for domestic livestock grazing, which would result in a substantial reduction in forage availability on federal lands. This reduction in forage availability would adversely affect ranching activity, including reducing billed AUMs, market, nonmarket, and social impacts associated with livestock grazing on public lands across communities. On annual average, livestock grazing on allotments where PHMA accounted for at least 15% of the acreage in the analysis areas for all 10 states combined is expected to result 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), compared with Alternative 1 (see **Table 11**, below, for a summary of direct and total impacts by state, and see **Appendix 18** for a more detailed discussion of impacts, including direct, indirect, and induced impacts by state).

Table 11. Average Annual Economic Contributions from Livestock Grazing in Allotments where PHMA Accounted for 15% or More of the Acreage, Under Alternative 3

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
California	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Colorado	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Idaho	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Montana	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Nevada	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
North Dakota	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Oregon	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
South Dakota	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Utah	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Wyoming	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Total Planning Area	Direct	0	0	0	0	0	0
	Total	0	0	0	0	0	0

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.
[1] Total impacts include direct, indirect, and induced impacts.

The restrictions on livestock grazing in large portions of federal allotments would impact the economic resilience of ranching and farming communities, as discussed in *Nature and Type of Effects,* especially in areas that are also reliant on mineral development due to the boom and bust economic cycle of the resources.

In many cases, BLM lands may have importance for a broader level of ranch operations, for example when providing important seasonal rotation pastures, and impacts limiting access to livestock grazing on BLM lands can result in large economic and social impacts for affected ranchers. Making PHMA unavailable to livestock grazing could result in increases in costs to ranchers and farmers who would have to find alternatives for federal forage for their livestock. The cost increases may lead to increases in meat prices if passed on to consumers and, in the long term, decreases in availability of meat and animal products. Increases in prices and decreases in availability of meat and animal products could put additional strain on households, especially those with lower incomes in rural areas, where food prices tend to be higher and a larger percentage of their disposable income goes towards food purchases.

Under Alternative 3, BLM decisions to restrict livestock grazing would likely have large market and nonmarket impacts on the local communities and economies across the analysis areas. There could be higher potential for closures of ranches or ranches selling lands to create ranchettes, which could have substantial impacts on social and economic conditions in some surrounding communities. These impacts include impacts on communities' well-being and social cohesion and impacts on access and quality of the ranching lifestyle, culture, and sense of place for those who rely on access to forage from federal land for their farming and ranching operations as well as for those who are part of the farming and ranching communities of interest and value livestock grazing on public lands. The regions that would be disproportionately affected include those communities and economies that rely on the agriculture industry and that have large quantities of small and midsize family farms and ranches where the operators' primary occupation is farming or ranching.[5] These

[5] Small family ranches are those with annual gross cash farm income less than $350,000 and midsize family ranches are those with annual gross cash farm income of at least $350,000 but less than $1 million. See **Section 3.11**, Social and Economic Conditions (Including Environmental Justice) and **Appendix 13**, Socioeconomic Baseline Report for more information on the types of ranches in the analysis area).

small and midsize ranches are located across most of the analysis area in each state of the planning area (see **Section 3.11**, Social and Economic Conditions) and **Appendix 13**, Socioeconomic Baseline Report).

Details for impacts on economic and social conditions due to BLM decisions on livestock grazing by state are included in **Appendix 18**.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Alternative 3 would have the highest level of restrictions on development in all HMAs, including the fewest acres open and the most stringent restrictions for mineral extraction. Alternative 3 would also provide the most protection for wildlife and habitat within GRSG management areas because of increased restrictions, and in some cases the prohibition of surface disturbing activities (including mineral development, renewable energy development, and ROW development). Alternative 3 would provide the highest level of support for conservation related values.

BLM decisions, under Alternative 3, would support the protection of GRSG ecosystems, which would continue to provide value to the surrounding communities through impacts on tribal interests and cultural resources, especially subsistence, from changes in GRSG populations. Conversely, habitat conservation could negatively impact road realignment projects near tribal reservations and plans to expand reservation boundaries if the reservation is surrounded by PHMA.

Environmental Justice

Rangewide Environmental Consequences

Alternative 3 would offer the highest level of protection to cultural resources in GRSG habitat across all alternatives. This would result in reduced impacts on environmental justice populations, as those described in Nature and Type of Effects. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Adverse impacts on subsistence resource availability, under Alternative 3, would be minimal due to the highest level of restrictions for mineral development and other surface-disturbing activities, compared with Alternative 1. See **Section 4.5**, Fish and Wildlife and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

The impacts on nonmarket and social conditions due to changes in air quality from mineral exploration and development and surface disturbing activities would substantially reduce, compared with Alternative 1, due to the increase in restrictions on mineral development. This would reduce the impacts on environmental justice populations. Due to restrictions in vegetation management, impacts on air quality from increased wildfire risk could increase. These impacts could disproportionately impact environmental justice populations, but the impacts would depend on site-specific factors such as location of changes in air quality compared with the locations of environmental justice populations that cannot be determined in this analysis. See **Section 4.13**, Air Resources and Climate.

Large swaths of public land would be unavailable for livestock grazing and closed to mineral leasing, which would likely increase production costs to ranchers and nonenergy leasable mineral operators as they use alternative lands for forage and mining operations, if available. Depending on the ability of the affected permittees and mining leases to adapt and mitigate to the loss of public land forage and public lands for mineral leasing, the increases in costs could lead to either higher prices of meat and household products if the costs are passed on to consumers or closures in ranching and mining operations, which would lead to a decrease in availability of meat and household products. These impacts would disproportionately affect low-

income environmental justice populations, because marginal increases in prices of meat and household products make up a larger percentage of the disposable income from low-income households than the general public and low-income households tend to have fewer alternatives if meat and household products become unavailable. The restrictions in livestock grazing and nonenergy leasable mineral development that could lead to impacts on prices and availability are localized and vary across geographic regions. The impacts of meat and household product prices and availability would likely be observed regionally and nationally, especially in areas with higher low-income populations. See subsections in this section on *Nonenergy Leasable Minerals* and *Livestock Grazing* as well as **Section 4.10.2**, Nonenergy Leasable Minerals, and **Section 4.8**, Livestock Grazing.

Restrictions on mineral development in PHMA under Alternative 3 could contribute to budget shortfalls for state and local governments that are highly dependent on mineral revenues, like many counties in Wyoming, and may affect their ability to provide public services. Reductions in public services could adversely affect the quality of life in affected communities. Since some public services are more heavily used by low-income individuals and families, insufficient funding for programs may disproportionately adversely impact low-income populations if access to those services was reduced.

Economic impacts, such as impacts on environmental justice populations from greater restrictions in livestock grazing and mineral and oil and gas development are not included in the discussion on environmental justice. This issue was dismissed from the discussion because, at the time of this analysis, there is a lack of evidence that the types of operations that are most likely to impacted by BLM management decisions (such as mining, renewable energy, and small family-owned ranching and livestock operations) employ a higher percentage of people who meet the criteria for environmental justice. Therefore, there is not evidence that impacts on economic conditions due to BLM decisions will lead to disproportionate impacts on environmental justice populations. Impacts on economic conditions may occur across the analysis area, and these impacts on economic output, jobs, and labor income from changes in livestock grazing, mineral, oil and gas, and renewable energy development activity are discussed and analyzed in other subsections in this section, as it relates to all populations in the analysis area (see the *Fluid Minerals (Oil and Gas), Renewable Energy (Geothermal, Wind, and Solar),* and *Livestock Grazing* subsections). Additional screening and consideration of environmental justice populations and analysis of any disproportionate and adverse impacts will occur at the implementation stage at a scale commensurate with the scope and scale of management actions being considered to provide additional protections for local GRSG populations. Depending on conditions at that time, communities with environmental justice concerns may change.

10.12.5 Alternative 4

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

The number of wells drilled and completed would be the same as under Alternative 1 in Montana, Nevada, North Dakota, South Dakota, Utah, and Wyoming, so the impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 1 for these states (see **Table 12**, below). Under Alternative 4, oil and gas production revenue and well development expenditures are expected to increase in Colorado and Idaho due to more areas available for leasing and addition of more exceptions and waivers and oil and gas production revenue and well development expenditures are expected to decrease in Wyoming due to all land in PHMA managed as NSO (see **Section 4.6**, Mineral Resources). On annual average, this change is expected to result in about 5,000 to 6,000 fewer total jobs (about 3,000 fewer direct jobs), about $375 million to $435 million less in total labor income (about $250 million to $274 million less in direct labor income), and about $3.1 million to $2.9

million less in economic output (about $2.4 to $2.5 million less in direct economic output) than under Alternative 1, across these three states. Additional details for state-specific direct, indirect, and induced impacts are included in **Appendix 18**.

Table 12. Average Annual Economic Contributions from Oil and Gas, Under Alternative 4

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Colorado (Low Scenario)	Direct	6,948	6,948	835,579,681	835,579,681	4,210,876,842	4,210,876,842
	Total	19,116	23,572	1,572,945,903	1,999,834,792	6,469,461,097	7,437,254,132
Colorado (High Scenario)	Direct	13,366	13,366	1,607,628,515	1,607,628,515	8,094,956,453	8,094,956,453
	Total	36,759	45,318	3,024,814,147	3,844,614,938	12,436,843,453	14,296,431,664
Idaho	Direct	10	10	600,005	600,005	3,122,924	3,122,924
	Total	21	23	1,175,158	1,265,448	5,074,042	5,394,649
Montana	Direct	1,922	1,922	284,762,972	284,762,972	1,318,085,631	1,318,085,631
	Total	5,046	5,299	467,912,653	484,846,192	1,893,586,767	1,939,453,416
Nevada	Direct	18	18	249,165	249,165	6,374,761	6,374,761
	Total	41	42	2,133,031	2,182,516	11,445,990	11,681,292
North Dakota	Direct	275	275	31,990,856	31,990,856	406,307,567	406,307,567
	Total	551	573	46,571,864	47,955,782	466,716,295	471,407,239
South Dakota	Direct	89	89	7,090,932	7,090,932	34,541,446	34,541,446
	Total	238	264	14,081,147	15,735,559	61,206,393	66,872,391
Utah	Direct	2,368	2,368	162,438,183	162,438,183	1,619,804,067	1,619,804,067
	Total	5,204	7,059	309,658,031	453,626,368	2,125,280,538	2,450,509,848
Wyoming	Direct	8,563	8,563	830,351,311	830,351,311	8,484,142,024	8,484,142,024
	Total	19,203	19,217	1,472,154,155	1,473,168,664	10,643,320,357	10,646,486,671
Total Planning Area (Low Colorado Scenario)	Direct	20,194	20,194	2,153,063,106	2,153,063,106	16,083,255,261	16,083,255,261
	Total	49,421	56,049	3,886,631,943	4,478,615,322	21,676,091,480	23,029,059,639
Total Planning Area (High Colorado Scenario)	Direct	26,611	26,611	2,925,111,940	2,925,111,940	19,967,334,873	19,967,334,873
	Total	67,064	77,795	5,338,500,188	6,323,395,467	27,643,473,836	29,888,237,171

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] There were no oil and gas developments projected for California and Oregon.

[2] Total impacts include direct, indirect, and induced impacts.

Mineral development would continue to support federal, state, and local mineral revenues at levels similar to those estimated under Alternative 1, except for impacts in Colorado, Idaho, and Wyoming, as described in **Appendix 18**, which could lead to an overall decrease in federal, state, and local revenues, compared with Alternative 1. Changes in mineral revenues available to fund public services and infrastructure in Montana, Nevada, North Dakota, South Dakota, and Utah would be negligible relative to those under Alternative 1. Across Colorado, Idaho, and Wyoming, there could be a reduction in royalty revenue by $295

million to $312 million, in state severance tax revenue by $120 million to $121 million, ad valorem tax revenue by $117 million to $121 million, and other taxes and fees by $720,000 to $829,000. Overall changes in oil and gas activity, across the 3 states, could lead to a decrease in revenue from rents and bonus bids, compared with Alternative 1. Additionally, the reduction in oil and gas activity would likely lead to less direct and indirect spending, which would lead to a decrease in sales and use tax, compared with Alternative 1.

Impacts on nonmarket and social conditions associated with changes in air quality and GHG emissions from fluid mineral leasing would be similar to Alternative 1, except in Colorado and Wyoming, as discussed in **Appendix 18**. Alternative 4 would minimize impacts on nonmarket and social conditions associated with air quality and GHG emissions by promoting project designs that avoid, minimize, reduce, rectify, and mitigate for direct and indirect impacts. Social impacts from way-of-life, culture, and social cohesion for the communities who value mineral extraction in Idaho, Montana, Nevada, North Dakota, South Dakota, and Utah would be similar to those described under Alternative 1.

See **Appendix 18** for additional detail of state-level impacts for Colorado Idaho, and Wyoming.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Under Alternative 4, many of the economic and social impacts from changes in nonenergy leasable minerals due to BLM-management decisions would be the same as under Alternative 1 for all states in the planning area.

Under Alternative 4, the BLM would manage minerals to minimize land use conflict and associated impacts from subsequent development through project designs that avoid, minimize, reduce, rectify, and mitigate for indirect impacts. The BLM would take a more adaptive approach to management and consider existing data and best available science to determine if conservation measures are reasonable. While the impacts on nonmarket and social conditions related to air quality and GHG emissions would be reduced or removed in some cases, compared with Alternative 1, impacts could increase due to an increase in development and surface disturbing activities, compared with Alternative 1.

Nevada/California

In Nevada and northeastern California, exceptions to the nonenergy leasable mineral closure in PHMA under Alternative 1 may allow for increased development of nonenergy leasable minerals, which could lead to impacts on nonmarket and social conditions such as access to clean air, health and safety from changes in air quality and GHG emissions, and reduced visitor and viewer enjoyment from changes in air quality, in some locations.

Locatable Minerals Management

Rangewide Environmental Consequences

Under Alternative 4, there would be no areas recommend for withdrawal from locatable mineral entry. As noted above, recommendations for withdrawal do not restrict any activities; therefore, they have no effects. Similarly, not recommending an area for withdrawal does not have any effects. There would be no impact to jobs, income, economic output and social conditions, as discussed in *Nature and Types of Effects*, under Alternative 4 different from those under Alternative 1.

Mineral Materials Management

Rangewide Environmental Consequences

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.

Idaho

In Idaho, under Alternative 4, economic and social impacts from proposed management and impacts on mineral material development would be the same as described under the Alternative 2 *Idaho* section.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

The number of geothermal plants developed would be the same as under Alternative 1 in all states (see **Appendix 12**, Reasonably Foreseeable Development Scenario, for more detail), so the impacts on jobs, labor, income, economic output from geothermal development would also be the same as described under Alternative 1 (see **Table 13**, below, for a summary of direct and total impacts by state, and see **Table 18-15** in **Appendix 18** for direct, indirect, and induced impacts by state).

Table 13. Average Annual Economic Contributions from Geothermal, Under Alternative 4

State[1]	Type of Impact[2]	Employment	Labor Income	Economic Output
California and Nevada Combined	Direct	276	17,088,024	24,364,445
	Total	540	35,982,758	106,272,068
Colorado	Direct	8	536,971	761,363
	Total	16	1,057,306	2,658,444
Idaho	Direct	22	1,020,547	1,413,689
	Total	36	1,795,032	4,930,353
Oregon	Direct	6	297,479	402,124
	Total	11	576,996	1,509,272
Utah	Direct	12	742,958	1,059,324
	Total	22	1,349,977	3,599,534
Wyoming	Direct	6	288,314	388,376
	Total	9	432,268	1,286,669
Total Planning Area	Direct	330	19,974,293	28,389,321
	Total	634	41,194,337	120,256,340

Source: National Renewable Energy Laboratory 2016

[1]There were no geothermal power plant developments projected for Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas under all alternatives.

[2] Total impacts include direct, indirect, and induced impacts.

Utility scale wind and solar projects in PHMA would be managed as ROW exclusion areas, under Alternative 4 (see **Appendix 12**, 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, relocating wind and solar operations might not be possible or feasible, if access to transmission lines is limited, due to the high costs associated with building transmission lines and because ROW avoidance and exclusion areas would impact transmission lines as well. As noted in Alternative 1 discussion, if additional lines of transmission are needed, this could result in impacts on

economic contributions of wind and solar. Under Alternative 4, impacts may be increased compared to the Alternative 1 due to increased restrictions on solar and wind site development due to ROW exclusion areas.

Livestock Grazing Management

Rangewide Environmental Consequences

Estimated billed AUMs, under Alternative 4, would be the same as under Alternative 1 for all states and analysis areas, so market impacts on jobs and income from livestock grazing would also be the same as described under Alternative 1 (see **Table 14**, below, for a summary of direct and total impacts by state, and see **Table 18-16** in **Appendix 18** for direct, indirect, and induced impacts by state). In addition, social impacts from way-of-life, culture, and social cohesion would be similar to those described under Alternative 1.

Impacts on livestock grazing operations and associated non-market values from designating GRSG habitat as HMAs would be similar to those described for Alternative 1.

Table 14. Average Annual Economic Contributions from Livestock Grazing in Allotments where PHMA Accounted for 15% or More of the Acreage, Under Alternative 4

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
California	Direct	7	7	2,146,636	2,146,636	4,625,897	4,625,897
	Total	19	22	3,105,261	3,386,449	7,436,887	8,391,031
Colorado	Direct	50	50	1,844,864	1,844,864	5,164,123	5,164,123
	Total	78	82	2,995,610	3,200,447	9,046,152	9,841,613
Idaho	Direct	77	77	13,312,954	13,312,954	28,474,475	28,474,475
	Total	214	221	22,450,229	22,805,297	55,796,422	57,280,261
Montana	Direct	186	186	10,506,213	10,506,213	33,185,106	33,185,106
	Total	364	381	20,177,827	20,978,060	64,895,970	67,265,732
Nevada	Direct	82	82	13,703,178	13,703,178	42,086,589	42,086,589
	Total	230	236	23,293,363	23,567,530	74,802,986	76,657,180
North Dakota	Direct	1	1	39,141	39,141	143,402	143,402
	Total	1	1	62,321	64,077	228,340	235,019
Oregon	Direct	78	78	6,451,505	6,451,505	25,184,996	25,184,996
	Total	197	206	13,466,487	14,139,416	47,731,985	50,012,006
South Dakota	Direct	5	5	185,898	185,898	1,405,882	1,405,882
	Total	10	10	373,256	402,461	2,335,006	2,458,076
Utah	Direct	54	54	4,634,026	4,634,026	10,839,099	10,839,099
	Total	87	90	6,083,969	6,218,740	16,268,163	16,915,273
Wyoming	Direct	301	301	14,742,131	14,742,131	52,633,690	52,633,690
	Total	547	552	24,819,572	25,059,882	90,295,946	91,280,444
Total Planning Area	Direct	841	841	67,566,546	67,566,546	203,743,259	203,743,259
	Total	1,747	1,801	116,827,895	119,822,359	368,837,857	380,336,635

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] Total impacts include direct, indirect, and induced impacts.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Impacts would be similar to that described in Alternative 1, with some additional state analysis area variation in level of protection for GRSG and associated impacts on those groups prioritizing development or conservation values. The level of impacts to non-market values associated with GRSG would therefore vary by area based on the determination of site-specific development restrictions determined by state.

Environmental Justice

Rangewide Environmental Consequences

Impacts from BLM-management decisions on environmental justice populations through cultural resource disturbance would be similar to Alternative 1. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Impacts on subsistence resource availability, could be reduced due to minerals management strategies that reduce possibilities of consequences from potential development in GRSG habitats or giving preference to lands that would not obstruct the suitability and proper operation of GRSG habitats. See **Section 4.5**, Fish and Wildlife and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Impacts on nonmarket and social conditions from changes in air quality and GHG emissions from mineral development may increase compared with Alternative 1 due to the wavers, exceptions, and modifications that would be allowed under Alternative 4, which could increase mineral extraction. This would likely result in adverse and disproportionate impacts on environmental justice populations. See **Section 4.13**, Air Resources and Climate.

10.12.6 Alternative 5

Fluid Minerals (Oil and Gas) Management

Rangewide Environmental Consequences

The number of wells drilled and completed would be the same as under Alternative 1 in Montana, Nevada, North Dakota, South Dakota, and Utah, so the impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 1 for these states (see **Table 15**, below). Under Alternative 5, oil and gas production revenue and well development expenditures are expected to increase in Colorado and Idaho due to more areas available for leasing and addition of more exceptions and waivers and oil and gas production revenue and well development expenditures are expected to decrease in Wyoming due to all land in PHMA managed as NSO, relative to Alternative 1 (see **Section 4.6**, Mineral Resources). On annual average, this change is expected to result in about 130 to 840 more total jobs (about 150 fewer direct jobs to 50 more direct jobs), about $20 million to $81 million more in total labor income (about $8.5 million less in direct labor income to $15.3 million more in direct labor income), and about $179 million less in total economic output to $46.6 million more in total economic output (about $106 million to $231 million less in direct economic output) than under Alternative 1, across these three states. Additional details for state-specific direct, indirect, and induced impacts are included in **Appendix 18**.

Table 15. Average Annual Economic Contributions from Oil and Gas, Under Alternative 5

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Colorado (Low Scenario)	Direct	6,948	6,948	835,579,681	835,579,681	4,210,876,842	4,210,876,842
	Total	19,116	23,572	1,572,945,903	1,999,834,792	6,469,461,097	7,437,254,132
Colorado (High Scenario)	Direct	13,366	13,366	1,607,628,515	1,607,628,515	8,094,956,453	8,094,956,453
	Total	36,759	45,318	3,024,814,147	3,844,614,938	12,436,843,453	14,296,431,664
Idaho	Direct	10	10	576,005	576,005	2,998,007	2,998,007
	Total	20	22	1,128,152	1,214,830	4,871,080	5,178,863
Montana	Direct	1,922	1,922	284,762,972	284,762,972	1,318,085,631	1,318,085,631
	Total	5,046	5,299	467,912,653	484,846,192	1,893,586,767	1,939,453,416
Nevada	Direct	18	18	249,165	249,165	6,374,761	6,374,761
	Total	41	42	2,133,031	2,182,516	11,445,990	11,681,292
North Dakota	Direct	275	275	31,990,856	31,990,856	406,307,567	406,307,567
	Total	551	573	46,571,864	47,955,782	466,716,295	471,407,239
South Dakota	Direct	89	89	7,090,932	7,090,932	34,541,446	34,541,446
	Total	238	264	14,081,147	15,735,559	61,206,393	66,872,391
Utah	Direct	2,368	2,368	162,438,183	162,438,183	1,619,804,067	1,619,804,067
	Total	5,204	7,059	309,658,031	453,626,368	2,125,280,538	2,450,509,848
Wyoming	Direct	11,198	11,198	1,096,050,568	1,096,050,568	10,787,200,027	10,787,200,027
	Total	25,108	25,129	1,926,942,851	1,928,447,281	13,596,694,725	13,601,390,097
Total Planning Area (Low Colorado Scenario)	Direct	22,828	22,828	2,418,738,362	2,418,738,362	18,386,188,347	18,386,188,347
	Total	55,326	61,960	4,341,373,633	4,933,843,320	24,629,262,886	25,983,747,279
Total Planning Area (High Colorado Scenario)	Direct	29,246	29,246	3,190,787,196	3,190,787,196	22,270,267,959	22,270,267,959
	Total	72,969	83,706	5,793,241,877	6,778,623,466	30,596,645,242	32,842,924,810

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] There were no oil and gas developments projected for California and Oregon.

[2] Total impacts include direct, indirect, and induced impacts.

Mineral development would continue to support federal, state, and local mineral revenues at levels similar to those estimated under Alternative 1, except for impacts in Colorado, Idaho, and Wyoming, as described in **Appendix 18**. Changes in mineral revenues available to fund public services and infrastructure in Montana, Nevada, North Dakota, South Dakota, and Utah would be negligible relative to those under Alternative 1. Across Colorado, Idaho, and Wyoming, compared with Alternative 1, there could be an reduction in royalty revenue by $11 million to $28 million, a decrease in state severance tax revenue by $17 million to $19 million, a reduction in ad valorem tax revenue ranging from $10 million to $14 million, and an increase in other fees and taxes on oil and gas production by $22,000 to $131,000. Changes in oil and gas activity, under Alternative 5, could lead to a change in revenue from rents, bonus bids, and sales and use tax, compared with Alternative 1. The magnitude and direction of the change in revenue from rents, bonus bids

and sales and use tax depend on state- and site-specific factors (see Appendix 18 for more discussion on these revenues by state for Colorado, Idaho, and Wyoming).

Impacts on nonmarket and social conditions associated with air quality and climate change to the surrounding communities and regions would be similar as described under Alternative 1. Social impacts from way-of-life, culture, and social cohesion for the communities who value mineral extraction in Montana, Nevada, North Dakota, South Dakota, and Utah would be similar to those described under Alternative 1.

See **Appendix 18** for additional detail of state-level impacts for Colorado Idaho, and Wyoming.

Nonenergy Leasable Minerals Management

Rangewide Environmental Consequences

Economic and social impacts from changes in nonenergy leasable minerals due to BLM-management decisions would be the same as under Alternative 1 for all states in the planning area.

Locatable Minerals Management

Rangewide Environmental Consequences

The impacts on the economic activities and social conditions associated with locatable mineral resources would be the same as described under Alternative 4 above.

Mineral Materials Management

Rangewide Environmental Consequences

Impacts on public access to mineral materials and social and nonmarket values of mineral material extraction would likely be the same as under Alternative 4.

Renewable Energy (Geothermal, Wind, and Solar) Management

Rangewide Environmental Consequences

The number of geothermal plants developed would be the same as under Alternative 1 in all states (see **Appendix 12**, Reasonably Foreseeable Development Scenario), so the impacts on jobs, labor, income, economic output from geothermal development would also be the same as described under Alternative 1 (see **Table 16**, below, for a summary of direct and total impacts by state, and see **Table 18-18** in **Appendix 18** for direct, indirect, and induced impacts by state).

Lands encompassing major ROWs and utility scale wind and solar in PHMA would be managed as ROW avoidance areas, while in GHMA they would be managed as open to ROWs. The impacts of BLM decisions on economic activity and market conditions from wind, solar, and transmission line development across all states would be the same as under Alternative 4.

Table 16. Average Annual Economic Contributions from Geothermal, Under Alternative 5

State[1]	Type of Impact[2]	Employment	Labor Income	Economic Output
California and Nevada Combined	Direct	276	17,088,024	24,364,445
	Total	540	35,982,758	106,272,068
Colorado	Direct	8	536,971	761,363
	Total	16	1,057,306	2,658,444
Idaho	Direct	22	1,020,547	1,413,689
	Total	36	1,795,032	4,930,353

State[1]	Type of Impact[2]	Employment	Labor Income	Economic Output
Oregon	Direct	6	297,479	402,124
	Total	11	576,996	1,509,272
Utah	Direct	12	742,958	1,059,324
	Total	22	1,349,977	3,599,534
Wyoming	Direct	6	288,314	388,376
	Total	9	432,268	1,286,669
Total Planning Area	Direct	330	19,974,293	28,389,321
	Total	634	41,194,337	120,256,340

Source: National Renewable Energy Laboratory 2016
[1]There were no geothermal power plant developments projected for Montana, North Dakota, and South Dakota due to limited geothermal potential in the analysis areas under all alternatives.
[2] Total impacts include direct, indirect, and induced impacts.

Livestock Grazing Management

Rangewide Environmental Consequences

Estimated billed AUMs, under Alternative 5, would be the same as under Alternative 1 for all states and analysis areas, so impacts on jobs and income from livestock grazing would also be the same as described under Alternative 1 (see **Table 17**, below, for a summary of direct and total impacts by state, and see **Table 18-19** in **Appendix 18** for direct, indirect, and induced impacts by state). Social impacts from way-of-life, culture, and social cohesion would be similar to those described under Alternative 1.

Impacts on livestock grazing operations and associated non-market values from designating GRSG habitat as HMAs would be similar to those described for Alternative 1.

Table 17. Average Annual Economic Contributions from Livestock Grazing in Allotments where PHMA Accounted for 15% or More of the Acreage, Under Alternative 5

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
California	Direct	7	7	2,146,636	2,146,636	4,625,897	4,625,897
	Total	19	22	3,105,261	3,386,449	7,436,887	8,391,031
Colorado	Direct	50	50	1,844,864	1,844,864	5,164,123	5,164,123
	Total	78	82	2,995,610	3,200,447	9,046,152	9,841,613
Idaho	Direct	77	77	13,312,954	13,312,954	28,474,475	28,474,475
	Total	214	221	22,450,229	22,805,297	55,796,422	57,280,261
Montana	Direct	186	186	10,506,213	10,506,213	33,185,106	33,185,106
	Total	364	381	20,177,827	20,978,060	64,895,970	67,265,732
Nevada	Direct	82	82	13,703,178	13,703,178	42,086,589	42,086,589
	Total	230	236	23,293,363	23,567,530	74,802,986	76,657,180
North Dakota	Direct	1	1	39,141	39,141	143,402	143,402
	Total	1	1	62,321	64,077	228,340	235,019
Oregon	Direct	78	78	6,451,505	6,451,505	25,184,996	25,184,996
	Total	197	206	13,466,487	14,139,416	47,731,985	50,012,006
South Dakota	Direct	5	5	185,898	185,898	1,405,882	1,405,882
	Total	10	10	373,256	402,461	2,335,006	2,458,076
Utah	Direct	54	54	4,634,026	4,634,026	10,839,099	10,839,099
	Total	87	90	6,083,969	6,218,740	16,268,163	16,915,273

State	Type of Impact[1]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Wyoming	Direct	301	301	14,742,131	14,742,131	52,633,690	52,633,690
	Total	547	552	24,819,572	25,059,882	90,295,946	91,280,444
Total Planning Area	Direct	841	841	67,566,546	67,566,546	203,743,259	203,743,259
	Total	1,747	1,801	116,827,895	119,822,359	368,837,857	380,336,635

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.
[1] Total impacts include direct, indirect, and induced impacts.

Greater Sage Grouse Conservation

Rangewide Environmental Consequences

Impacts would be similar to that described in Alternative 1, with some additional state analysis area variation in level of protection for GRSG and associated impacts on those groups prioritizing development or conservation values. The level of impacts to non-market values associated with GRSG would therefore vary by area based on the determination of site-specific development restrictions determined by state.

Environmental Justice

Rangewide Environmental Consequences

Iimpacts from BLM-management decisions on environmental justice populations through cultural resource disturbance would be similar to Alternative 1. See **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Impacts on environmental justice populations from changes in subsistence resource availability, under Alternative 5, would be similar to Alternative 1. See **Section 4.5**, Fish and Wildlife and **Section 4.17**, Tribal Interests and **Section 4.16**, Cultural Resources.

Impacts on nonmarket and social conditions due to changes in air quality and GHG emissions from mineral development would be minimized by promoting project designs that avoid, minimize, reduce, rectify, and mitigate for indirect impacts. This would reduce the impacts on environmental justice populations, compared with Alternative 1. See **Section 4.13**, Air Resources and Climate.

10.12.7 Alternative 6

All impacts would be the same as described for Alternative 5 except for the impacts described below.

Fluid Minerals (Oil and Gas) Management

The number of wells anticipated to be drilled and completed over the planning period would be the same as under Alternative 5 in all states except for Wyoming, so the market impacts on jobs, labor, income, economic output from oil and gas development and operations would also be the same as described under Alternative 5 for these states (see **Table 18**, below). Under Alternative 6, compared with Alternative 1, oil and gas production revenue and well development expenditures are expected to decrease in Wyoming (see **Section 4.10**, Mineral Resources). On annual average, oil and gas production revenue and well development expenditures in the Wyoming analysis area is expected to result in about 1,400 fewer total jobs (about 600 fewer direct jobs), about $110 million less in total labor income (about $64 million less in direct labor income), and about $717 million less in economic output (about $559 million less in direct economic output),

than under Alternative 1, throughout the state. Additional details for state-specific direct, indirect, and induced impacts are included in **Appendix 18**.

Table 18. Average Annual Economic Contributions from Oil and Gas, Under Alternative 6

State[1]	Type of Impact[2]	Employment		Labor Income		Economic Output	
		Analysis Area	State	Analysis Area	State	Analysis Area	State
Colorado (Low Scenario)	Direct	6,948	6,948	835,579,681	835,579,681	4,210,876,842	4,210,876,842
	Total	19,116	23,572	1,572,945,903	1,999,834,792	6,469,461,097	7,437,254,132
Colorado (High Scenario)	Direct	13,366	13,366	1,607,628,515	1,607,628,515	8,094,956,453	8,094,956,453
	Total	36,759	45,318	3,024,814,147	3,844,614,938	12,436,843,453	14,296,431,664
Idaho	Direct	10	10	576,005	576,005	2,998,007	2,998,007
	Total	20	22	1,128,152	1,214,830	4,871,080	5,178,863
Montana	Direct	1,922	1,922	284,762,972	284,762,972	1,318,085,631	1,318,085,631
	Total	5,046	5,299	467,912,653	484,846,192	1,893,586,767	1,939,453,416
Nevada	Direct	18	18	249,165	249,165	6,374,761	6,374,761
	Total	41	42	2,133,031	2,182,516	11,445,990	11,681,292
North Dakota	Direct	275	275	31,990,856	31,990,856	406,307,567	406,307,567
	Total	551	573	46,571,864	47,955,782	466,716,295	471,407,239
South Dakota	Direct	89	89	7,090,932	7,090,932	34,541,446	34,541,446
	Total	238	264	14,081,147	15,735,559	61,206,393	66,872,391
Utah	Direct	2,368	2,368	162,438,183	162,438,183	1,619,804,067	1,619,804,067
	Total	5,204	7,059	309,658,031	453,626,368	2,125,280,538	2,450,509,848
Wyoming	Direct	11,089	11,089	1,085,144,628	1,085,144,628	10,691,456,750	10,691,456,750
	Total	24,865	24,886	1,908,227,615	1,909,712,421	13,474,139,017	13,478,773,144
Total Planning Area (Low Colorado Scenario)	Direct	22,720	22,720	2,407,832,421	2,407,832,421	18,290,445,070	18,290,445,070
	Total	55,083	61,717	4,322,658,396	4,915,108,461	24,506,707,178	25,861,130,327
Total Planning Area (High Colorado Scenario)	Direct	29,137	29,137	3,179,881,256	3,179,881,256	22,174,524,682	22,174,524,682
	Total	72,726	83,463	5,774,526,641	6,759,888,606	30,474,089,534	32,720,307,858

Source: IMPLAN 2021 Data for model region including counties in the socioeconomic analysis area in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming as well as for all counties in the state using the multi-regional input-output analysis.

[1] There were no oil and gas developments projected for California and Oregon.

[2] Total impacts include direct, indirect, and induced impacts.

The decrease in projected oil and gas activity in Wyoming, under Alternative 6, would result in reductions in tax revenues by about $69 million in royalty revenue, $25 million in state severance tax revenue, $26 million in ad valorem tax revenue, and $208,000 in and gas conservation tax revenue, compared with Alternative 1. Additionally, a reduction in oil and gas activity, in Wyoming, under Alternative 6, could lead to a decrease in revenue from rents, bonus bids, and sales and use taxes, compared with 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, including education. There could be impacts from BLM decisions on

lifestyles and culture for those in mineral development communities of interest, especially for those individuals who rely on oil and gas extraction for employment.

The reduction in the acreage available for fluid mineral leasing, in Wyoming, could reduce the development-related impacts on nonmarket and social conditions associate with changes in air and GHG emissions, compared with Alternative 1.

Nonenergy Leasable Minerals Management

Impacts would be the same as described under Alternative 5 except that any existing nonenergy 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. The impacts would be limited to areas within ACECs.

Locatable Minerals Management

Under Alternative 6, requiring a plan of operations for exploration operations disturbing five acres or less in ACECs would increase administrative process and cost for operators conducting exploration. This could result in a reduction in exploration in ACECs which 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.

Mineral Materials Management

Restrictions on mineral material development in ACECs could result in impacts on economic and social conditions. Due to mineral materials being available in other locations, the impacts are not anticipated to be large.

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. The types of actions that can result in impacts on air quality are discussed in more detail in **Section 4.13.1**, Nature and Type of Effects.

The analysis assumes that oil and gas development would be the dominant source of criteria air pollutant and HAP emissions and impacts on air quality from BLM-authorized activity in the planning area; therefore, overall impacts are assessed using emission estimates from oil and gas development. The BLM has conducted the 2032 Western US Photochemical Air Quality Modeling study to assess the impacts of fossil fuel development and production and other cumulative sources on air quality and air quality related values in BLM-administered lands in the seven US intermountain western states (Colorado, Montana, New Mexico, North Dakota, South Dakota, Utah, and Wyoming. Modeling results represent emission sources for year 2032 based on anticipated future oil, gas, and coal development, other human-caused (anthropogenic) emissions, and natural sources on air quality and air quality related values such as visibility and deposition (Ramboll 2023). Quantitative estimate of average annual emissions under each alternative from federal oil and gas development are shown in **Table 4-1**; these were estimated by scaling circa 2032 modeled emissions in states that overlap with the planning area (Ramboll 2023; see **Appendix 12, Section 12.11**, Air Pollutant and Greenhouse Gas Emission Calculation).

Analysis of impacts from other activities including from other mineral development (saleable and locatable minerals), solar and wind energy development, ROWs, traffic and road construction, and livestock grazing is discussed qualitatively. Potential impacts on air quality from implementing Alternatives 2, 3, 4, 5, and 6 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:

- Tons of annual criteria air pollutant emission changes from oil and gas development.
- 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.

Alternative 1

Rangewide Environmental Consequences

Under Alternative 1, in most of the planning area PHMA (IHMA in Idaho), except as noted under the state-specific sub-headings below, fluid mineral leasing would continue to be managed as NSO. While this would continue to eliminate emission sources in PHMA (IHMA in Idaho), impacts could be relocated within the planning area, and continue to impact air quality as described in the *Nature and Types of Effects*. Fluid mineral development and production would continue to be the primary source of emissions from BLM-authorized activity in the planning area. Under Alternative 1, potential emissions from oil and gas development in the Greater Sage-Grouse planning area represent 0.19% of annual carbon monoxide, 3.11% of nitrogen oxide, 0.03% of PM_{10}, 0.08% of $PM_{2.5}$, 3.15% of sulfur dioxide, and 1.49% of VOC emissions from the planning area counties. For more detail on average annual emission estimates for each state see **Table 4-1.**

Under Alternative 1, except as noted under the state-specific sub-headings below, potential impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal within the planning area GHMA where there is no specific allocation, and within PHMA (IHMA in Idaho) from new free use permits and expansion of existing leases would continue.

Under Alternative I, potential for impacts on air quality from locatable mineral development would continue in all GHMA and PHMA (IHMA in Idaho).

Under Alternative 1, except as noted under the state specific sub-heading below, potential impacts on air quality from major and minor ROWs in PHMA/IHMA and GHMA, where it would continue to be managed as avoidance for major ROWs and open to minor ROWs, would continue. Under Alternative 1, except as noted under the state-specific sub-headings below, wind and solar development would continue to be managed as avoidance in GHMA and as exclusion in PHMA (IHMA in Idaho). This would continue to reduce potential impacts on air quality associated with emissions and surface-disturbing activities in GHMA and eliminate sources of impacts on air quality in PHMA, as described in the *Nature and Types of Effects*.

Under Alternative 1, impacts on air quality from changes in livestock grazing would continue in PHMA (IHMA in Idaho) and GHMA across the planning area. Impacts would continue to largely be determined by variations in site-specific management actions that minimize surface-disturbing actions. These management actions would continue to indirectly reduce impacts on air quality from changes in livestock grazing described in the *Nature and Types of Effects*.

Colorado Environmental Consequences

Under Alternative 1, Colorado GHMA would continue to be managed as closed to fluid mineral leasing within 1 mile of leks, NSO within 2 miles of leks, and seasonal limitations elsewhere, and PHMA would continue to be closed to fluid mineral leasing within 1 mile of leks. While in areas that remain as closed or as open with NSO stipulations for fluid mineral leasing, sources of impacts on air quality would be removed, impacts may be relocated to elsewhere within the planning area where fewer restrictions on fluid mineral leasing exists.

Idaho Environmental Consequences

Under Alternative 1, fluid mineral leasing would continue to be managed as NSO in Idaho IHMA and as CSU in GHMA. Within GHMA, potential for impacts on air quality from fluid mineral leasing would continue to exist while in areas that remain designated NSO for fluid mineral leasing, emissions sources would be eliminated. However, the potential for displacement of impacts to elsewhere within the planning area where fewer restrictions on fluid mineral leasing exist would continue.

Under Alternative 1, potential impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal would continue to exclude impacts from new free use permits and continue to be limited to impacts from expansion of existing permits.

Under Alternative 1, potential for impacts on air quality from wind, solar, and other major ROWs would continue within GHMA in Idaho where it would continue to be open to such use. Potential for impacts on air quality from solar and wind development in Idaho IHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects, would continue to be higher compared with PHMA in other planning area states.

Nevada/California Environmental Consequences

Under Alternative 1, potential for impacts on air quality from fluid mineral leasing would continue in Nevada and California GHMA where it would continue to be open to fluid mineral leasing, subject to CSU stipulations.

Under Alternative 1, potential for impacts on air quality from solar and wind projects would continue to exist in Nevada and California PHMA from non-utility-scale solar and wind, and from major ROWs or wind projects in GHMA, which would continue to be managed as avoidance. No air quality impacts from solar

development within the Nevada and California PHMA would occur, where it would continue to be managed as exclusion for solar projects.

Oregon Environmental Consequences

Under Alternative 1, while potential for impacts on air quality from fluid mineral leasing within 1 mile of leks would continue to be eliminated, potential for impacts outside of the 1-mile radius, where it would continue to be open to fluid mineral leasing and subject to CSU stipulations, would continue to exit.

Under Alternative 1, potential for impacts on air quality from solar and wind projects would continue in Oregon PHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects (except in Lake, Harney, and Malheur Counties where it is avoidance and impacts could occur within PHMA).

Utah Environmental Consequences

Under Alternative 1, potential impacts on air quality from fluid mineral leasing in Utah GHMA would continue, where it would continue to be managed as NSO near leks or CSU based on allocations in plans that predated the 2015 amendment. While in areas that remain designated as NSO for fluid mineral leasing, sources of impacts on air quality would be removed, impacts may be relocated to elsewhere within the planning area, where fewer restrictions on fluid mineral leasing exists. In areas open to fluid mineral leasing with CSU stipulations, potential for impacts on air quality would continue to exist.

Under Alternative 1, GHMA in Utah would continue to be open to wind and other major ROWs (subject to minimization and mitigation), which would continue to result in air quality impacts that are associated with emissions and surface-disturbing activities. Under Alternative 1, potential for impacts on air quality from wind projects would continue to exist in PHMA in Utah to within 5 miles of leks.

Wyoming Environmental Consequences

Under Alternative 1, in Wyoming, GHMA would be managed as NSO within 0.25 miles of leks, and seasonal limitations within 2 miles of leks, while PHMA would continue to be managed as NSO within 0.6 miles of leks and as CSU or with timing limitations outside. While in areas that remain designated as NSO for fluid mineral leasing, sources of impacts on air quality would be removed, impacts may be relocated to elsewhere within the planning area, where fewer restrictions on fluid mineral leasing exists. In areas open to fluid mineral leasing with CSU stipulations or timing limitations, potential for impacts on air quality would continue to exist.

Under Alternative 1, potential impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for saleable sales or disposal would continue to exist within PHMA in Wyoming, where it would continue to be managed as open, subject to occupancy, seasonal limitations, disturbance, and density for such use.

Under Alternative 1, potential impacts on air quality would continue to exist from major and minor ROWs, and from solar and wind development, in Wyoming PHMA, where it would be open to such use.

Alternative 2

Rangewide Environmental Consequences

Under Alternative 2, impacts on air quality from closure to leasing or stipulations applied to fluid mineral leasing in PHMA and GHMA would be the same as under Alternative 1, except in Colorado as described under the state-specific sub-heading below.

Under Alternative 2, impacts on air quality from proposed management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal in PHMA and GHMA would be the same as under Alternative 1, except in Idaho IHMA and Nevada PHMA as described in the state-specific sub-headings below.

Under Alternative 2, removing the recommendation for withdrawal of locatable mineral entry in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment) would not change impacts on air quality because as discussed under Alternative 1, recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 2, impacts on air quality from changes in GRSG habitat protected from major and minor ROWs and from solar and wind development would be the same as under Alternative 1, except in Nevada for solar energy development and major ROWs, and in Nevada and Utah for wind energy development, as described in the state-specific sub-headings below.

Under Alternative 2, impacts on air quality from changes in livestock grazing would be similar to those described under Alternative 1. However, there would be more exceptions to restrictions on livestock grazing than under Alternative 1, which could result in increased potential localized impacts on air quality in PHMA or IHMA.

Colorado Environmental Consequences

Under Alternative 2, PHMAs in Colorado would be designated as NSO for fluid mineral development. Compared with Alternative 1, under which areas within 1 mile of leks would remain closed to fluid mineral leasing, this would increase potential impacts on air quality. Compared with Alternative 1, changing GHMA from closed to fluid mineral leasing within 1 mile of leks and NSO within 2 miles of leks under Alternative 1 to NSO within 1 mile of leks under this alternative would likely result in an increase in air emissions because the amount of federal mineral estate available for leasing and development would be greater under this alternative. Under Alternative 2, annual emissions from fluid mineral leasing would increase on average by 0.7% compared with Alternative 1.

Idaho Environmental Consequences

Under Alternative 2, allowing consideration of new free use permits for saleable minerals in Idaho IHMA, would increase the potential for associated impacts on air quality compared with Alternative 1. This is because there would be a greater chance for more acres of saleable mineral activities to occur in these areas.

Nevada/California Environmental Consequences

Under Alternative 2, adding an exception criterion to saleable and nonenergy mineral closures for Nevada PHMA would increase the potential for associated impacts on air quality. This is because there would be a greater chance for more area of saleable mineral activities to occur in these areas.

Under Alternative 2, there would be an exception criterion avoidance for ROWs and to the closure to wind and solar development in Nevada PHMA and to wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on air quality associated with changes in land protected from or open to renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid impacts on air quality.

Utah Environmental Consequences

Under Alternative 2, areas outside PHMAs that are within 5 miles of leks in Utah would be avoidance for wind development. This could increase the potential for impacts on air quality associated with changes in land protected from wind development compared with Alternative 1. This is because there would be a higher chance of development in an avoidance area as opposed to an exclusion area that includes an exception criterion to closure.

Alternative 3

Rangewide Environmental Consequences

Under Alternative 3, closing PHMA to fluid mineral leasing, saleable mineral sales and disposal, and nonenergy mineral leasing would reduce potential impacts on air quality from actions such as surface disturbance, associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced compared with Alternative 1. The recommendation to withdraw all PHMA from location and entry under the US mining laws would not impact air quality because considering whether to withdraw certain lands is a separate action with its own NEPA analysis.

New infrastructure development would be substantially limited compared with Alternative 1. Under Alternative 3, prohibiting development of wind, solar, and other major ROWs would eliminate the likelihood for impacts on air quality from changes in land protected from or open to such surface-disturbing activities in these areas.

Compared with Alternative 1, Alternative 3 contains greater restrictions on other resources and would most greatly reduce the potential for impacts on air quality from changes in land protected from or open to livestock grazing as described under the *Nature and Type of Effects*. However, removing grazing may result in the accumulation of fine fuels, potentially leading to wildfires that could impact air quality.

Colorado Environmental Consequences

Under Alternative 3, annual emissions from fluid mineral leasing in Colorado would on average decrease by 27.7%, compared with Alternative 1.

Montana Environmental Consequences

Under Alternative 3, annual emissions from fluid mineral leasing in Montana would on average decrease by 40.5%, compared with Alternative 1.

North Dakota Environmental Consequences

Under Alternative 3, annual emissions from fluid mineral leasing in North Dakota would on average decrease by 15.4%, compared with Alternative 1.

South Dakota Environmental Consequences

Under Alternative 3, annual emissions from fluid mineral leasing in South Dakota would on average decrease by 1.2%, compared with Alternative 1.

Utah Environmental Consequences

Under Alternative 3, annual emissions from fluid mineral leasing in Utah would on average decrease by 9.8%, compared with Alternative 1.

Wyoming Environmental Consequences

Under Alternative 3, annual emissions from fluid mineral leasing in Wyoming would on average decrease by 38.0%, compared with Alternative 1.

Alternative 4

Rangewide Environmental Consequences

Under Alternative 4, impacts on air quality from fluid mineral leasing would be similar to Alternative 1. Under Alternative 4, impacts on air quality from management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal, would be the same as under Alternative 1, except in some states as discussed under state-specific subheadings below.

Under Alternative 4, PHMA in all states, and IHMA to within 3.1 miles from active leks, would be managed as exclusion for utility-scale wind and solar energy projects. Therefore, no air quality impacts from utility-scale wind or solar projects would be expected in those areas, similar to IHMA in Idaho, and PHMA in Nevada/California and Oregon (except in Lake, Harney, and Malheur Counites where potential for impacts remain, because it would be managed as avoidance under Alternative 1). Under Alternative 4, potential for impacts on air quality from utility-scale solar or wind development would be less than the potential for impacts from construction of such projects in Wyoming and Utah under Alternative 1, where the management action is either avoidance, or exclusion with exception criterion.

Under Alternative 4, site-specific management actions would continue to have impacts on air quality resulting from changes in livestock grazing as described under the *Nature and Type of Effects*. The emphasized flexibility under Alternative 4, compared to Alternative 1, would help ensure that grazing practices remain in compliance with established guidelines, reducing impacts on air quality compared with Alternative 1.

Colorado Environmental Consequences

Under Alternative 4, annual emissions from fluid mineral leasing in Colorado would on average increase by 4.1%, compared with Alternative 1.

Wyoming Environmental Consequences

Under Alternative 4, annual emissions from fluid mineral leasing in Wyoming would on average decrease by 19.9%, compared with Alternative 1.

Alternative 5

Rangewide Environmental Consequences

Under Alternative 5, impacts on air quality from mineral development would be similar to Alternative 1, except in some states as discussed under state-specific subheadings below. Under Alternative 5, PHMA would be designated as avoidance for utility-scale wind and solar projects, prioritizing the protection of GRSG habitat and, in turn, reducing the impacts on air quality as described under the *Nature and Type of Effects*. In contrast, GHMA would remain open for utility-scale wind and solar development, accompanied by specific minimization measures to mitigate potential impacts on air quality as described under the *Nature and Type of Effects*.

The measures under Alternative 5, compared with Alternative 1, would improve disturbance management and mitigate potential degradation, which could have long-term benefits on air quality conditions for GRSG's sagebrush habitat across different states and specific boundaries.

Under Alternative 5, like Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA for GRSG, except for certain RNAs in Oregon that may be partially or entirely unavailable for grazing. Changes in livestock grazing would be determined by site-specific management actions aiming to decrease surface disturbance activities which would have impacts on air quality as described under the *Nature and Types of Effects*.

Alternative 5 introduces a targeted approach for the inclusion of thresholds and responses. which, compared with Alternative 1, would focus efforts on the priority areas, promoting the establishment of suitable habitat and thus minimizing impacts on air quality by reducing land disturbance as described under the *Nature and Type of Effects*.

Colorado Environmental Consequences

Under Alternative 5, annual emissions from fluid mineral leasing in Colorado would be the same as Alternative 4.

Wyoming Environmental Consequences

Under Alternative 5, annual emissions from fluid mineral leasing in Wyoming would on average decrease by 3.3%, compared with Alternative 1.

Alternative 6

Rangewide Environmental Consequences

Under Alternative 6, impacts on air quality would be similar to Alternative 5, except in some states as discussed under state-specific subheadings below. ACECs under Alternative 6 would restrict some uses, in accordance with the ACEC boundaries and restrictions under Alternative 3, which could reduce potential sources of pollutants.

Wyoming Environmental Consequences

Under Alternative 6, annual emissions from fluid mineral leasing in Wyoming would on average decrease by 3.9%, compared with Alternative 1.

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. GHG emissions from oil and gas development (**Table 4-2**) was estimated by scaling the circa 2032 modeled emissions for states that overlap with the planning area (Ramboll 2023; see **Appendix 12, Section 12.11**, Air Pollutant and Greenhouse Gas Emission Calculation). Grazing emissions were estimated by evaluating methane emissions from enteric fermentation and manure management, and nitrous oxide emissions from manure deposited on rangeland according to methodologies included in USDA guidelines (USDA 2023), and the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhous Gas Inventories, Volume 4, Agriculture, Forestry and Other Land Use (IPCC 2019). Grazing emissions were based on the 5-year averaged billed AUM values in each state (see Table 3-10 in **Appendix 14**, Socioeconomic Baseline Report). Potential impacts on climate change from implementing Alternatives 2, 3, 4, 5, and 6 are 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, locatable 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)

Assumptions

In addition to the assumptions in **Section 4.1.1**, Analytical Assumptions, this analysis assumes wild horses and burros, wild ungulates, livestock, and wildlife species all contribute similar GHG emissions.

Alternative 1

Rangewide Environmental Consequences

Except as noted under the state-specific subheading below, in most of the planning area PHMA (IHMA in Idaho), fluid mineral leasing would continue to be managed as NSO. While this would continue to eliminate emission sources and improve carbon sequestration in PHMA (IHMA in Idaho), development could be relocated within the planning area, and continue to result in increased GHG emissions and changes to carbon sequestration.

Under Alternative 1, potential emissions from oil and gas development in the Greater Sage-Grouse planning area represent 0.03% of state-wide GHG emissions in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming (29,436 million metric tons of CO_2e; **Table 3-18**). Social cost of GHGs from oil and gas development for the 20-year life of the project would be 2,263 million dollars (2020 dollars) at the 5% discount rate and 7,179 million dollars at 3% discount rate calculated using methodology developed by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG 2021).

Except as noted below, potential impacts on GHG emissions and carbon sequestration from management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal within the planning area GHMA where there is no specific allocation, and within PHMA (IHMA in Idaho) from new free use permits and expansion of existing leases would continue.

Potential for impacts on GHG emissions and carbon sequestration from locatable mineral development would continue in all GHMA and PHMA (IHMA in Idaho).

Most states would continue to manage PHMAs (or IHMA in Idaho) as avoidance areas for major ROWs, and exclusion for wind and solar ROWs (Idaho, Nevada/California, and Oregon have exclusion for utility scale solar and wind projects only). In most states, GHMAs would continue to be managed as either avoidance or open for major ROWS, wind, and solar projects. In exclusion areas which do not allow for ROWs, there would be no impacts on GHG emissions or changes to carbon sequestration. In avoidance

areas, while the potential for impacts would remain, this would be less than the potential for impacts in areas that would remain open to ROWs or have fewer restrictions.

Restrictions on surface-disturbing activities on BLM lands, including mineral development and ROWs, might push development onto private land, which could result in indirect impacts as described under *Nature and Types of Effects*.

Impacts on GHG emissions and carbon sequestration from changes in livestock grazing would continue to largely be determined by variations in AUMs and site-specific management actions that involve surface-disturbing actions. Under Alternative 1, livestock grazing would result in 24,400 metric tons of methane and from enteric fermentation and manure management and 19,782,000 metric tons of nitrous oxide from direct and indirect emissions due to manure deposited on rangeland. This would result in 5,401 million metric tons of 100-year CO_2e and 5,402 million metric tons of 20-year CO_2e, representing 18% of total GHG emissions from state-wide grazing emissions in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, and Wyoming. Social cost of GHGs for the 20-year life of the project would be 1,960,000 million dollars at the 5% discount rate and 6,886,000 million dollars at 3% discount rate (IWG 2021).

Management actions that would continue to indirectly reduce impacts on climate change from changes in livestock grazing include managing for riparian vegetation, applying the principles of prescriptive livestock grazing to control time and timing of grazing during the hot season, and retiring grazing privileges on a voluntary basis.

Impacts on GHG emissions and carbon sequestration from changes in wild horse and burro management would continue to largely be determined by variations in AMLs and site-specific management actions that involve surface-disturbing actions. Management actions that would continue to indirectly reduce impacts on climate change from changes in wild horse and burro management include implementing wild horse and burro gathers and fertility treatments.

Colorado Environmental Consequences

Colorado GHMA would continue to be managed as closed to fluid mineral leasing within 1 mile of leks, NSO within 2 miles of leks, and seasonal limitations elsewhere, while PHMA would continue to be closed to fluid mineral leasing within 1 mile of leks. Emission sources and impacts to carbon sequestration could be displaced and would continue to result in overall impacts on climate change.

Idaho Environmental Consequences

Fluid mineral leasing would continue to be managed as NSO in Idaho IHMA and as CSU in GHMA. Within GHMA. Emission sources and impacts to carbon sequestration could be displaced and would continue to result in overall impacts on climate change.

Potential impacts on GHG emissions and carbon sequestration from management of BLM-administered federal mineral estate as closed to or available for saleable mineral sales or disposal would continue to exclude impacts from new free use permits and continue to be limited to impacts from expansion of existing permits.

Potential for impacts on GHG emission and carbon sequestration from wind, solar, and other major ROWs would continue within GHMA in Idaho where it would continue to be open to such use. Potential for impacts on GHG emissions and carbon sequestration from solar and wind development in Idaho IHMA, where it

would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects, would continue to be higher compared with PHMA in other planning area states.

Nevada/California Environmental Consequences

Potential for impacts on GHG emissions and carbon sequestration from fluid mineral leasing would continue in Nevada and California GHMA where it would continue to be open to fluid mineral leasing, subject to CSU stipulations.

Potential for impacts on GHG emissions and carbon sequestration from solar and wind projects would continue to exist in Nevada and California PHMA from non-utility-scale solar and wind, and from major ROWs or wind projects in GHMA, which would continue to be managed as avoidance. No impacts from solar development within the Nevada and California PHMA would occur, where it would continue to be managed as exclusion for solar projects.

Oregon Environmental Consequences

While potential for impacts on GHG emissions and carbon sequestration from fluid mineral leasing within 1 mile of leks would continue to be eliminated, potential for impacts outside of the 1-mile radius, where it would continue to be open to fluid mineral leasing and subject to CSU stipulations, would continue to exit.

Potential for impacts on GHG emissions and carbon sequestration from solar and wind projects would continue in Oregon PHMA, where it would continue to be managed as avoidance for solar and wind development and only excluded for utility scale projects (except in Lake, Harney, and Malheur Counties where it is avoidance and impacts could occur within PHMA).

Utah Environmental Consequences

Potential impacts on GHG emissions and carbon sequestration from fluid mineral leasing in Utah GHMA would continue, where it would continue to be managed as NSO near leks or CSU based on allocations in plans that predated the 2015 amendment. Emission sources and impacts to carbon sequestration would be displaced and would continue to result in overall impacts on climate change.

GHMA in Utah would continue to be open to wind and other major ROWs (subject to minimization and mitigation), which would continue to result in GHG emissions and carbon sequestration impacts that are associated with emissions and surface-disturbing activities. Under Alternative 1, potential for impacts on climate change from development of wind projects would continue to exist in PHMA in Utah to within 5 miles of leks.

Wyoming Environmental Consequences

Wyoming, GHMA would be managed as NSO within 0.25 miles of leks, and seasonal limitations within 2 miles of leks, while PHMA would continue to be managed as NSO within 0.6 miles of leks and as CSU or with timing limitations outside. While in areas that remain designated as NSO for fluid mineral leasing, emission sources and impacts on carbon sequestration would be removed, impacts may be relocated to elsewhere within the planning area, where fewer restrictions on fluid mineral leasing exists. In areas open to fluid mineral leasing with CSU stipulations or timing limitations, potential for impacts on GHG emissions and carbon sequestration would continue to exist.

Potential impacts on GHG emissions and carbon sequestration from proposed management of BLM-administered federal mineral estate as closed to or available for saleable sales or disposal would continue to

exist within PHMA in Wyoming, where it would continue to be managed as open, subject to occupancy, seasonal limitations, disturbance, and density for such use.

Potential impacts on GHG emissions and carbon sequestration would continue to exist from major and minor ROWs, and from solar and wind development, in Wyoming PHMA, where it would be open to such use.

Alternative 2

Rangewide Environmental Consequences

Impacts on GHG emissions and carbon sequestration from changes in land protected from or open to fluid minerals in PHMA and GHMA would be the same as under Alternative 1, except as described below. Under Alternative 2, the social cost of GHGs from oil and gas development for the 20-year life of the project would be 2,269 million dollars at the 5% discount rate and 7,199 million dollars at 3% discount rate (IWG 2021).

Impacts on GHG emissions and carbon sequestration from changes in land protected from or open to saleable minerals in PHMA and GHMA would be same as under Alternative 1, except in Idaho IHMA and Nevada PHMA as described in the state-specific sub-headings below.

Impacts on GHG emissions and carbon sequestration from nonenergy mineral management in PHMA and GHMA would be the same as under Alternative 1, except in Nevada PHMA as described in the state-specific sub-headings below.

Removing the recommendation for withdrawal of locatable mineral entry in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment) would not change impacts on GHG emissions and carbon sequestration compared with Alternative 1, because as discussed under Alternative 1, recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Impacts on GHG emissions and carbon sequestration from changes in land protected from or open to renewable energy management would be the same as under Alternative 1, except in Nevada and Utah as described in the state-specific sub-headings below.

Impacts on GHG emissions and carbon sequestration from changes in livestock grazing would be similar to those described under Alternative 1. There would be more exceptions to restrictions on livestock grazing than under Alternative 1, which could have increased potential impacts on climate change in PHMA or IHMA.

Impacts on GHG emissions and carbon sequestration from changes in wild horse and burro management would be the same as those described under Alternative 1.

Colorado Environmental Consequences

PHMAs in Colorado would be designated as NSO for fluid mineral development. Compared with Alternative 1, under which areas within 1 mile of leks would remain closed to fluid mineral leasing. Under Alternative 2, annual GHG emissions from fluid mineral leasing would increase by 0.7, compared with Alternative 1. This would increase potential impacts on climate change from increased emissions and surface disturbance.

Idaho Environmental Consequences

Allowing consideration of new free use permits for saleable minerals in Idaho IHMA, would increase the potential for associated impacts on GHG emissions and carbon sequestration. This is because there would be a greater chance for more area of saleable and/or nonenergy mineral open to activities to occur, increasing potential GHG emissions and reducing carbon storage in the land from surface disturbance.

Nevada/California Environmental Consequences

Adding an exception criterion to saleable and nonenergy mineral closures for Nevada PHMA would increase the potential for associated impacts on GHG emissions and carbon sequestration as described in the Nature and Types of Effects. This is because there would be a greater chance for more area of saleable and/or nonenergy mineral open to activities to occur in these areas, increasing potential GHG emissions and reducing carbon storage in the landscape from surface disturbance.

There would be additional exception criteria for areas open to wind/solar development in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for development, increasing impacts on GHG emissions and carbon sequestration associated with changes in land protected from or open to renewable energy development because there would be a higher chance of development.

Utah Environmental Consequences

Areas outside PHMAs in Utah would be avoidance for wind development. This could increase the potential for impacts on GHG emissions and carbon sequestration associated with changes in land protected from wind development compared with Alternative 1. This is because there would be a higher chance of development in avoidance areas as opposed to exclusion areas under Alternative 1, which would not allow any development.

Alternative 3

All GRSG management areas would be managed as PHMAs which would be closed to fluid mineral leasing, saleable minerals, and nonenergy minerals and would be recommended for withdrawal from locatable mineral entry. Under Alternative 3, the social cost of GHGs from oil and gas development for the 20-year life of the project would be 1,535 million dollars at the 5% discount rate and 4,915 million dollars at the 3% discount rate (IWG 2021).

All PHMAs would be managed as exclusion areas for major ROWs and wind or solar energy, unavailable to livestock grazing, and wild horses and burros would be removed. ROW exclusion would preclude development of Class VI projects. Under Alternative 3, GHG emissions from livestock grazing would be reduced to zero. Due to a reduction in the level of use from added restrictions, including removal of most major surface disturbing activities, livestock grazing, and wild horse and burros, Alternative 3 would result in the least amount of GHG emissions and surface disturbance on BLM-administered lands, compared with all alternatives. However, such restrictions could shift such development and associated impacts to state, tribal, or private lands, where GHG emissions and surface disturbance would still occur. Any reduction in development of minerals under the Mining Law of 1872 would only occur if the Secretary were to propose and make a withdrawal pursuant to section 204 of FLPMA.

Colorado Environmental Consequences

Under Alternative 3, annual GHG emissions from fluid mineral leasing in Colorado would decrease by 27.3% compared with Alternative 1.

Montana Environmental Consequences
Under Alternative 3, annual GHG emissions from fluid mineral leasing in Montana would decrease by 41.6% compared with Alternative 1.

North Dakota Environmental Consequences
Under Alternative 3, annual GHG emissions from fluid mineral leasing in North Dakota would decrease by 15.4% compared with Alternative 1.

South Dakota Environmental Consequences
Under Alternative 3, annual GHG emissions from fluid mineral leasing in South Dakota would decrease by 1.1% compared with Alternative 1.

Utah Environmental Consequences
Under Alternative 3, annual GHG emissions from fluid mineral leasing in Utah would decrease by 9.8% compared with Alternative 1.

Wyoming Environmental Consequences
Under Alternative 3, annual GHG emissions from fluid mineral leasing in Wyoming would decrease by 36.7% compared with Alternative 1.

Alternative 4
Impacts on GHG emissions and carbon sequestration would be the same as those described for Alternative 1 except as discussed below. The BLM would manage minerals to minimize land use conflict and associated impacts from subsequent development through project designs that avoid, minimize, reduce, rectify, and mitigate for indirect impacts. Under Alternative 4, the social cost of GHGs from oil and gas development for the 20-year life of the project would be 2,135 million dollars at the 5% discount rate and 6,777 million dollars at the 3% discount rate.

PHMAs and IHMAs would be managed as avoidance for major ROWs within 0.5-mile buffer zone. GHMA would be managed as avoidance areas within breeding, nesting, and limited-seasonal habitats where mapped. Under this alternative, the BLM would take a more adaptive approach to management and consider existing data and best available science to determine if conservation measures are reasonable. While the impacts on climate change would be reduced or removed in some cases, under the scenario which management would allow more development, impacts would include an increase in GHG emissions and reduction of carbon sequestration would increase compared with Alternative 1.

Colorado Environmental Consequences
Under Alternative 4, annual emissions from fluid mineral leasing in Colorado would increase by 4.0%, compared with Alternative 1.

Wyoming Environmental Consequences
Under Alternative 4, annual emissions from fluid mineral leasing in Wyoming would decrease by 19.3%, compared with Alternative 1.

Alternative 5
Impacts on GHG emissions and carbon sequestration would be the same as those described for Alternative 1 except as discussed below. The BLM would apply a balanced approach to development by managing to minimize potential for conflict in important habitat. This would result in an increase in GHG emissions and

carbon sequestration in situations where more development would occur while can result in a reduction in impacts where less development would occur. Under Alternative 5, the social cost of GHGs from oil and gas development for the 20-year life of the project would be 2,271 million dollars at the 5% discount rate and 7,208 million dollars at the 3% discount rate.

Alternative 5 would be less restrictive than Alternative 4 in terms of allowing for mineral and renewable energy development. Alterations in impacts, wherein a decrease in development is anticipated under Alternative 4 compared to Alternative 1, would likely result in a greater reduction of impacts under Alternative 5.

Colorado Environmental Consequences

Under Alternative 5, annual emissions from fluid mineral leasing in Colorado would be the same as Alternative 4.

Wyoming Environmental Consequences

Under Alternative 5, annual emissions from fluid mineral leasing in Wyoming would decrease by 3.2%, compared with Alternative 1.

Alternative 6

Impacts on GHG emissions and carbon sequestration would be the same as described for Alternative 5, except in Wyoming where there would be an increase in oil and gas emissions. ACECs under Alternative 6 would restrict some uses, in accordance with the ACEC boundaries and restrictions under Alternative 3, which could reduce surface disturbance and potential sources of GHGs. Similar to Alternative 3, such restrictions in ACECs could shift surface disturbance and development and associated impacts to state, tribal, or private lands. Under Alternative 6, the social cost of GHGs from oil and gas development for the 20-year life of the project would be 2,266 million dollars at the 5% discount rate and 7,193 million dollars at the 3% discount rate.

Wyoming Environmental Consequences

Under Alternative 6, annual emissions from fluid mineral leasing in Wyoming would decrease by 3.7%, compared with Alternative 1.

10.14 SOIL RESOURCES

10.14.1 Methods and Assumptions

Methodology

The types of actions that can result in impacts on soil resources are discussed in more detail in **Section 4.14.1**, Nature and Type of Effects. 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 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**. The analysis also 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 burro management would reduce the impacts on soils.

10.14.2 Alternative 1

Livestock Grazing Management

Under Alternative 1, PHMA, IHMA (Idaho only), and GHMA would continue to be available for livestock grazing, except in Oregon where all or portions of 13 key RNAs would be unavailable. The BLM would continue to prioritize monitoring and permit renewal of grazing per IM 2018-024 or subsequent updated policy. SFAs and PHMA outside of SFAs should be considered high priority areas to assess. Impacts on soil productivity and erosion from changes in livestock grazing would be determined by variations in site-specific management actions that strive to minimize concentrated compaction and aim to maintain or improve soil conditions. Within the areas available for livestock grazing, the BLM Authorized Officer may include or adjust permit terms and conditions needed to meet land health standards and GRSG habitat objectives. In turn, these management actions would continue to help minimize local impacts on soil productivity and erosion from the changes in livestock grazing, which would continue to also help minimize rangewide impacts for long-term soil productivity as described in the *Nature and Types of Effects*.

Wild Horse and Burro Management

Under Alternative 1, wild horses and burros would be managed within their established AML levels with priority of wild horse and burro management actions occurring within PHMA and where herd management areas or herd areas overlap GRSG habitat. Soil health would improve under Alternative 1 since a reduction in the current population of wild horses and burros within the planning would reduce soil impacts caused by trampling and excessive forage use by wild horses and burros. Forage and plant community conditions would improve under Alternative 1 allow for soil productivity to increase and erosion to be reduced.

Management of Surface-disturbing Activities

Management actions proposed in this alternative that minimize, preclude, or stipulate surface disturbance would help maintain or improve soil productivity, such as the 3% disturbance cap. Management of fluid minerals, saleable minerals, and nonenergy mineral development in PHMA, GHMA, and IHMA varies by state and includes areas that are open, closed, and withdrawn (see **Chapter 2** alternatives for minerals management).These various restrictions on land protected from surface-disturbing activities and areas closed to surface-disturbing activities from mineral activities within PHMA, IHMA, and GHMA would continue to help minimize impacts on soil productivity and erosion as described under the *Nature and Types of Effects*.

PHMA and IHMA in all states would continue to be identified as ROW avoidance areas to allow for management flexibility, except for minor ROWs in Wyoming. PHMA would continue to be designated as ROW exclusion for wind and solar (utility scale solar only in Idaho, Nevada/California, and Oregon) development, with exceptions in Wyoming, Oregon, and Idaho. Classifying PHMA as exclusion or avoidance areas would decrease the potential for impacts on soil productivity and erosion associated with ROW development, such as the surface-disturbing activities described in the *Nature and Types of Effects*. This is because development of ROWs would be prohibited in exclusion areas and would be considered on a case-by-case basis in avoidance areas.

New ROWs in PHMA would continue to not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria. In IHMA, new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. The BLM would continue to collocate new ROWs with existing infrastructure when possible. The BLM would retain management flexibility to route ROWs to minimize overall impacts on soil productivity and erosion. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50% greater than the original footprint. These measures would continue to reduce negative impact to soil productivity from the surface-disturbing activities as described in *Nature and Types of Effects*. GHMA in all states would be open to minor ROWs with mitigation measures, except Wyoming would not require mitigation. Impacts on soil productivity and erosion associated with these surface-disturbing activities could occur in these areas if developed, but mitigation measures would help to lessen the impacts.

10.14.3 Alternative 2

Livestock Grazing Management

Under Alternative 2, impacts from changes in livestock grazing would be similar to those described above under Alternative 1.

Wild Horse and Burro Management

Under Alternative 2, references to management within SFA's would be removed in some states with the reference removed for GHMA in Utah. Management of wild horses and burros in herd management areas and AMLs would be the same as described in Alternative 1. Impacts to soil resources from wild horse and burro actions would be the same as Alternative 1, except for areas where SFA references are removed. This could cause forage and other vegetation to be removed in areas that were once references as SFAs. Soil productivity would be reduced and soil erosion could be increased in these areas under Alternative 2.

Management of Surface-disturbing Activities

Changes to the disturbance cap would apply and include allowing the cap to be exceeded in all states except Oregon under certain circumstances. This action could impact soil productivity and erosion as described in the *Nature and Type of Effects*.

Under Alternative 2, impacts from changes in land open to fluid minerals in PHMA and GHMA would be similar to those described above under Alternative 1, except in Colorado PHMA and Colorado GHMA where fluid mineral development would be open and would increase potential for surface-disturbing impacts on soil productivity and erosion, as compared to Alternative 1. This is because mineral development activities could occur in previously closed areas and cause negative impacts as described under *Nature and Types of Effects*. Changing GHMA from closed to fluid mineral development to NSO would likely not change impacts on soil resources because the NSO stipulation would avoid potential for land available to surface-disturbing activities.

Impacts from changes in land open to saleable mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Idaho IHMA and Nevada PHMA. Impacts from changes in land open to nonenergy mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Nevada PHMA. As compared with Alternative 1, the additional exception criterion to saleable and nonenergy mineral closures for Nevada PHMA and allowing consideration of new free use permits for saleable minerals in Idaho IHMA would increase the potential for associated impacts on soil productivity and erosion as described under the *Nature and Types of Effects*. This is because there would be a greater chance for saleable and/or nonenergy mineral activities to occur in these areas.

Removing the recommendation for locatable mineral withdrawal in SFAs in all states (except in MT/DK, which did not have a 2019 amendment) has no impact. This is because a recommendation to withdraw lands under the Mining Law of 1872 has no impact. Withdrawals are considered through a separate process pursuant to section 204 of FLPMA.

Impacts from changes in land protected from or open to ROW and renewable energy management would be similar to those described under Alternative 1, with additional exception criteria in Nevada/California. Under Alternative 2, there would be an additional exception criterion for ROW and wind and solar development in Nevada PHMA and for wind development in Nevada/California GHMA. As compared to Alternative 1, this could increase the potential for impacts on soil productivity and erosion associated with ROW and renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid major impacts on soil productivity and erosion as described under the *Nature and Type of Effects*.

Under Alternative 2, removing the prioritization objective for PHMA and GHMA, which involves determining the order or preference for leasing decisions, would not directly impact soil productivity and erosion because prioritization does not permit or preclude leasing in PHMA.As compared with Alternative 1, the NSO stipulations and conservation measures in place for PHMA would protect soil resources; however, the prioritization objective could potentially result in temporarily deferring a parcel in PHMA from leasing to a later sale, but only in instances of large lease sales where staff capacity would be incapable to analyzing all the nominated parcels. In an area with high levels of disturbance, such a delay could provide time for vegetation conditions and soil productivity to improve before new developments are implemented. As the amount of development increases in former GHMA, the consecutive effects of mitigating disturbances in PHMA could mount and could possibly affect soil productivity and erosion as described in the *Nature and Type of Effects*. Site-specific planning and other management from local resource management plans, and adhering to the land health standards, would reduce impacts on soil productivity and erosion in former GHMA with the use of BMP and other project mitigation design features.

10.14.4 Alternative 3

Livestock Grazing Management

Management of PHMA as unavailable for livestock grazing would eliminate the possibility of the short-term, site-specific impacts from changes in livestock grazing and the associated impacts on soil productivity and erosion as described under the *Nature and Types of Effects*. Compared with Alternative 1, Alternative 3 contains greater restrictions on livestock grazing and would be more protective of soil productivity from impacts related to livestock grazing.

Wild Horse and Burro Management

Under Alternative 3, there would be no new designation of herd management area in any herd areas that overlap with PHMA unless the area outside of the PHMA boundary could still support a herd management area. All wild horse and burros would be removed from existing PHMA. Soils in the planning area would experience short term impacts from wild horse and burro round up activities (i.e, off road vehicular travel and temporary corrals) that could cause soil erosion. The long terms impacts to soil resources in the planning area in comparison to Alternative 1 would be more beneficial because all wild horse and burro activity that impacts soils would be eliminated from PHMA.

Management of Surface-disturbing Activities

Application of a 3% disturbance cap and calculating disturbance at the project scale and HAF fine scale habitat selection area may prevent some development, and therefore reduce impacts to soil productivity and erosion. Compared with Alternative 1, Alternative 3 would have greater restrictions on new areas of land protected from or open to ROWs, fluid mineral leasing, and other mineral development and thus on development in these areas that would otherwise have the potential to impact soil productivity and erosion. PHMA in all states would be closed to fluid mineral leasing, saleable minerals, and nonenergy minerals would reduce potential impacts on soil productivity and erosion, such as areas available to surface-disturbance activities associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced to a greater extent than under Alternative 1. This is because areas closed to leasing could not be developed at any point. Recommendation to withdraw PHMA from location and entry under the US mining laws does not restrict any activities and therefore would not have any impact on soil productivity and erosion. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

New infrastructure development would be substantially limited as compared with Alternative 1. All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. The inability to site ROWs in PHMA would decrease the potential for impacts on soil productivity and erosion associated with ROW development and as described under the *Nature and Type of Effects*. The inability to site ROWs in PHMA could lead to longer ROW routes to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on soil productivity and erosion outside of PHMA and may result in increased impacts on soil productivity and erosion on adjacent state, tribal, or private lands.

Under Alternative 3, PHMA would be ROW exclusion for wind and solar energy development. Prohibiting wind energy development would eliminate impacts on soil productivity and erosion from changes in land protected from or open to this type of surface-disturbing activity in these areas. However, these prohibitions could result in the shifting of surface-disturbing activity and impacts on soil productivity and erosion to state, tribal or private lands.

10.14.5 Alternative 4

Livestock Grazing Management

Under Alternative 4, same as Alternative 1, livestock grazing would remain available in PHMA, IHMA, and GHMA, with the exception of 13 key RNAs in Oregon that may be fully or partially unavailable for grazing. Site-specific management actions would play a crucial role in determining the impacts on soil productivity and erosion resulting from changes in livestock grazing as described under the *Nature and Type of Effects*. These actions would minimize concentrated compaction and aim to maintain or improve soil productivity and minimize erosion, thereby mitigating effects on soil productivity and erosion as described under the *Nature and Type of Effects*. The BLM Authorized Officer would retain the authority to include or adjust permit terms and conditions within the areas available for livestock grazing. As compared with Alternative 1, the emphasized flexibility under Alternative 4 would ensure that grazing practices comply with existing land health standards under 43 CFR Part 4180 (or subsequent changes to regulations or policy) and contributes to minimizing local and implementation level impacts on soil productivity and erosion resulting from changes in livestock grazing as described in the *Nature and Types of Effects*.

Wild Horse and Burro Management

Under Alternative 4, wild horse and burro impacts would be similar to Alternative 1 with the direction to remove SFAs. Impacts to soil resources from wild horse and burro would be similar to was described in Alternative 1 and Alternative 2 with the exception of having reference to GHMA in Utah not being removed.

Management of Surface-disturbing Activities

Alternative 4 would include a 3% cap within the HAF fine scale habitat selection area in PHMA. Additionally, Alternative 4 would address habitat loss from wildfire and agriculture through existing sagebrush availability and habitat objectives. These measures under Alternative 4 would aim to manage and minimize disturbance, preserve vegetation communities, and mitigate the potential for further degradation while balancing impacts on soil productivity and erosion as described under the *Nature and Types of Effects*.

Under Alternative 4, additional management actions would be included compared with Alternative 1, specifically addressing fluid mineral leasing and development within GRSG PHMA, IHMA, and GHMA. Under Alternative 4, the proposed measures would include evaluating parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Alternative 4 would consider the management of areas already leased for fluid minerals, emphasizing the application of lease stipulations, minimization measures, and compliance with NEPA. With that, under Alternative 4 and similar to Alternative 1, the BLM would aim to minimize impacts on soil productivity and erosion by promoting project designs that avoid, minimize, reduce, rectify, and mitigate for direct and indirect impacts, while considering site-specific considerations and project specific COAs. However, a blanket NSO restriction on new leases in an area with existing leases complicates the effectiveness of the described efforts. Alternative 4 would also include enhanced collaboration with project proponents and state wildlife agencies to promote effective conservation and connectivity of habitats, while reducing impacts on soil productivity and erosion.

Alternative 4 would maintain the exclusion of PHMA for utility-scale wind and solar projects and would designate IHMA as exclusion within 3.1 miles from active leks, while the remaining IHMA areas are avoidance. Avoidance areas would also be designated within 0.5 miles of PHMA/IHMA to address indirect impacts. GHMA would be avoidance for utility-scale wind/solar projects. PHMA/IHMA would be avoidance for major ROWs, and areas within 0.5 miles of PHMA/IHMA would also be avoidance. GHMA would be avoidance

within breeding/nesting/limited-seasonal habitats or entirely if not mapped, and designated corridors remain open. These modifications in Alternative 4, compared with Alternative 1, would help reduce impacts on soil productivity and erosion, as described under the *Nature and Types of Effects*, while allowing for managed development in specific areas.

10.14.6 Alternatives 5 and 6

Livestock Grazing Management

Under Alternatives 5 and 6, similar to Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA, with the exception of certain RNAs in Oregon that may be partially or entirely unavailable for grazing (pending final determinations). The impacts on soil productivity and erosion resulting from changes in livestock grazing would be determined by variations in site-specific management actions. These actions would strive to minimize concentrated compaction and aim to maintain or improve soil productivity and erosion as described under the *Nature and Type of Effects*.

Under Alternatives 5 and 6, livestock grazing within GRSG PHMA, IHMA, and GHMA would be managed to meet land health standards, informed by the site-scale HAF suitability. The BLM Authorized Officer would have the flexibility to include or adjust permit terms and conditions within the available livestock grazing areas, ensuring compliance with land health standards and GRSG habitat objectives. Under Alternatives 5 and 6, construction of range infrastructure, such as water sources, structures, and fences, would be guided by guidelines that minimize impacts on GRSG and soil productivity and erosion as described under the *Nature and Type of Effects*, similar to the consolidation and simplification efforts of Alternative 1.

While Alternative 1 does not specify the areas where thresholds and responses would be required, Alternatives 5 and 6 would introduce a targeted approach. Under Alternatives 5 and 6, areas with the greatest potential to impact GRSG if suitable habitat conditions were not met would be prioritized for the inclusion of thresholds and responses. Accordingly, by focusing efforts on these priority areas, proactive conservation measures would be implemented, promoting the establishment of suitable habitat and minimizing impacts on soil productivity and erosion as described under the *Nature and Type of Effects*.

Wild Horse and Burro Management

Under Alternatives 5 and 6, wild horse and burro impacts to soil resources within the decision area would be similar to what is described in Alternative 1.

Management of Surface-disturbing Activities

Alternatives 5 and 6 include varying caps on disturbance at the project scale within PHMA, depending on the state. These measures under Alternatives 5 and 6 would aim to manage disturbance, protect vegetation communities, and mitigate potential degradation while reducing impacts on soil productivity and erosion, as described under the *Nature and Type of Effects*, across states and specific boundaries.

Alternatives 5 and 6 would include additional management actions compared to Alternative 1, specifically addressing fluid mineral leasing and development within GRSG PHMA, IHMA, and GHMA. The proposed measures under Alternatives 5 and 6 would include evaluating parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Additionally, Alternatives 5 and 6 would consider the management of areas already leased for fluid minerals, emphasizing the application of lease stipulations, minimization measures, and compliance with NEPA. Under Alternatives 5 and 6, the BLM would aim to minimize impacts to soil productivity and erosion as described under the *Nature and Type of Effects* by promoting project designs that avoid, minimize, reduce, rectify, and mitigate for direct and indirect impacts, while considering site-specific

considerations and project specific COAs. Collaboration with project proponents and state wildlife agencies would be encouraged to promote effective conservation and connectivity of habitats while reducing impacts to soil productivity and erosion.

Alternatives 5 and 6 would include notable changes compared to Alternative 1 for wind and solar development and major transmission ROW. Specifically, PHMA would be designated as avoidance for utility-scale wind and solar projects as well as major ROWs, prioritizing the protection of soil productivity. In contrast, GHMA would be open for utility-scale wind and solar development with the implementation of specific minimization measures to mitigate potential impacts on soil productivity and erosion. The designated corridors would remain open to accommodate transmission infrastructure. These modifications in Alternatives 5 and 6 would strike a balance between facilitating renewable energy development, ensuring transmission infrastructure access, and safeguarding the impacts on soil productivity and erosion as described under the *Nature and Type of Effects.*

10.15 WATER RESOURCES

10.15.1 Methods and Assumptions

Methodology

The types of actions that can result in impacts on water resources are discussed in more detail in **Section 4.15.1**, Nature and Type of Effects. 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 10.1.3**. 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, mineral resource development, 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.

10.15.2 Alternative 1

Livestock Grazing Management

Under Alternative 1, PHMA, IHMA, and GHMA would continue to be available for livestock grazing. In Oregon all or portions of 13 key RNAs would be unavailable to livestock grazing. The BLM would continue to prioritize monitoring and renewal of grazing in SFAs and PHMA outside of SFAs. This prioritization includes permit renewals in SFAs and PHMA, with the exception of cases outlined in IM 2018-024. These exceptions may encompass areas that have never undergone assessment or that comply with court orders. Impacts on water resource conditions from changes in livestock grazing would continue to largely be determined by variations in site-specific management actions. Some of the management actions could minimize surface-disturbing actions. In turn, these management actions would continue to help minimize local impacts on water resource conditions from changes in livestock grazing, which would also continue to help minimize rangewide impacts for long-term benefits to water resource conditions as described in the *Nature and Types of Effects*.

Wild Horse and Burro Management

Under Alternative 1, wild horse and burro would be managed within their established AML levels with priority of wild horse and burro management actions occurring within PHMA and where herd management areas or herd areas overlap GRSG habitat. These management actions would address overpopulated wild horse and burro areas, which are crucial for reducing strain on water quality, as these animals contribute to overgrazing and contamination, further impacting water resource conditions Water resources would improve under Alternative 1 as that a reduction in the current population of wild horse and burro within the planning area would reduce direct impacts wild horses and burros have on water resources.

Management of Surface-disturbing Activities

Within the rangewide planning area, impacts on water resource conditions are largely a result of variations in management actions. Management actions proposed in this action that minimize, preclude, or stipulate surface disturbance would help maintain or improve water resource conditions. Management of fluid minerals, saleable minerals, and nonenergy mineral development in PHMA, GHMA, and IHMA varies by state and includes areas that are open, closed, and withdrawn (see **Chapter 2** alternatives for minerals management). These various restrictions land protected from or open to surface disturbing activities within PHMA and GHMA would continue to help reduce impacts on water resource conditions as described under the *Nature and Types of Effects*. However, water flows across jurisdictional boundaries and such restrictions

could potentially shift such surface disturbance and associated impacts on water resource conditions from BLM lands to state, tribal, or private lands

PHMA and IHMA in all states would continue to be identified as ROW avoidance areas to allow for management flexibility, except for minor ROWs in Wyoming. PHMA would continue to be designated exclusion for wind and solar (utility scale solar only in Idaho, Nevada/California and Oregon) development, with exceptions in Wyoming, Oregon, and Idaho IHMA. Classifying PHMA as exclusion or avoidance areas would continue to decrease the potential for impacts on water resource conditions associated with changes in land open to ROW development, such as the surface-disturbing activities as described in the *Nature and Types of Effects*. This is because development of ROWs would continue to be prohibited in exclusion areas and would be considered on a case by-case basis in avoidance areas.

New ROWs in PHMA would continue to not be allowed except in accordance with the Anthropogenic Disturbance Screening Criteria outlined in the 2015 approved plan. In IHMA, new ROWs could be considered if in accordance with the IHMA Anthropogenic Disturbance Development Criteria. The BLM would continue to collocate new ROWs with existing infrastructure when possible. The BLM would continue to retain management flexibility to route ROWs to minimize overall impacts on water resource conditions. Existing ROW corridors are preferred for collocation of new ROWs but could not be widened more than 50% greater than the original footprint. These measures would continue to reduce negative impact to water resource conditions from surface-disturbing impacts described in the *Nature and Types of Effects*. However, water flows across jurisdictional boundaries, so BLM restrictions could potentially shift surface disturbance and associated impacts on water resources from BLM lands to state, tribal, or private lands. GHMA in all states would continue to be open to minor ROWs with mitigation measures, except Wyoming does not require mitigation. Impacts on water resource conditions associated with changes in land open to ROW development, such as surface disturbance could occur in these areas if developed, but mitigation measures, such as erosion control practices and revegetation, would help to lessen the impacts.

GRSG Management

Watershed health would continue to be affected by reducing water infiltration rates, increase overland flow and sediment loading, which could affect turbidity, temperature, and nutrient loading in water systems.

10.15.3 Alternative 2

Livestock Grazing Management

Under Alternative 2, impacts on water resource conditions from changes in livestock grazing would be similar to those described under Alternative 1. In Oregon, all or portions of the 13 key RNAs would be available to livestock grazing.

Wild Horse and Burro Management

Under Alternative 2, references to management within SFA's would be removed in some states with the reference removed for GHMA in Utah. Management of wild horses and burros in herd management areas and AMLs would be the same as described in Alternative 1. Impacts to water resources from wild horse and burro management actions would be the same as Alternative 1, except for areas where SFA references are removed. This could cause degradation of water resources that are present in areas that were once references as SFAs. Water quality would be reduced and competition between wildlife and wild horses and burros for water resources would increase under Alternative 2.

Management of Surface-disturbing Activities

Impacts on water resource conditions from changes in land protected from or open to fluid minerals in PHMA and GHMA would be the similar to those described under Alternative 1, except in Colorado PHMA and Colorado GHMA. Removing the closure of Colorado PHMA to fluid mineral development would increase potential for surface-disturbing impacts on water resource conditions. This is because fluid mineral development activities could occur in previously closed areas and cause impacts on water resource conditions as described under the *Nature and Types of Effects*. Compared with Alternative 1, changing GHMA from closed to fluid mineral development to NSO would likely not change impacts on water resource conditions because the NSO stipulation would avoid potential for these surface-disturbing activities.

Impacts on water resource conditions from changes in land protected from or open to saleable minerals in PHMA and GHMA would be similar to those described for Alternative 1, except in Idaho IHMA and Nevada PHMA. Impacts from nonenergy mineral management in PHMA and GHMA would be similar to those described under Alternative 1, except in Nevada PHMA. Under Alternative 2, adding an exception criterion to saleable and nonenergy mineral closures for Nevada PHMA, and allowing consideration of new free use permits for saleable minerals in Idaho IHMA, would increase the potential for associated impacts on water resource conditions as described in the *Nature and Types of Effects*. This is because there would be a greater chance for more area of saleable and/or nonenergy mineral open to activities to occur in these areas.

Under Alternative 2, removing the recommendation for locatable minerals in SFA in all states (except in Montana/Dakotas, which did not have a 2019 amendment, and Oregon, which retained SFA designation through a plan maintenance action and not an amendment.) would increase the potential for impacts on water resource conditions compared with Alternative 1. This is because locatable mineral activities could occur and cause impacts as described under the *Nature and Types of Effects*.

Impacts on water resource conditions from changes in land protected from or open to renewable energy management would be the similar to those described under Alternative 1, with additional exception criteria in Nevada/California. Under Alternative 2, there would be additional exception criteria for areas land open to wind/solar development in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on water resource conditions, as described under the *Nature and Type of Effects*, associated with changes in land protected from or open to renewable energy development because there would be a higher chance of development. However, the exception criteria would likely avoid impacts on water resource conditions.

Impacts on water resource conditions from changes in land protected from or open to ROW would be the similar to those described under Alternative 1, with additional exception criteria in Nevada/California. Under Alternative 2, there would be additional exception criteria for areas land open to ROW in Nevada PHMA and for wind development in Nevada/California GHMA. Compared with Alternative 1, this could increase the potential for impacts on water resource conditions, as described under the *Nature and Type of Effects*, associated with changes in land protected from or open to ROW development because there would be a higher chance of development. However, the exception criteria would likely avoid impacts on water resource conditions.

GRSG Management

Impacts on water resource conditions from changes in potential for wildfire would be the same as those described under Alternative 1 and as described under the *Nature and Type of Effects*.

10.15.4 Alternative 3

Livestock Grazing Management

All areas managed for GRSG would be PHMA. Compared with Alternative 1, Alternative 3 contains greater restrictions on other resources and would most greatly reduce the potential for impacts on water resource conditions as described under the *Nature and Type of Effects*. However, while Alternative 3 would be more protective of water resource conditions from impacts related to changes in land protected from or open to livestock grazing compared with Alternative 1, it could also make BLM lands more susceptible to wildfire. This increased wildfire risk could negatively impact water resources, as detailed in **Section 4.4**, which describes the increased likelihood of fire in greater detail.

Management of PHMA as unavailable for livestock grazing would eliminate the possibility of the short-term, site-specific impacts from changes in land protected from or open to livestock grazing and the associated impacts on water resource conditions as described under the *Nature and Type of Effects*. Alternative 3 would be more protective of water resource conditions from impacts related to changes in land protected from or open to livestock grazing compared with Alternative 1.

Wild Horse and Burro Management

Under Alternative 3, there would be no new designation of herd management area in any herd areas that overlap with PHMA unless the area outside of the PHMA boundary could still support a herd management area. All wild horse and burros would be removed from existing PHMA. Water resources within PHMA would improve with the direct impacts of wild horses and burros on water resources being eliminated.

Management of Surface-disturbing Activities

Compared with Alternative 1, Alternative 3 would have greater restrictions on new ROWs, fluid mineral leasing, and other mineral development and thus on areas land open to development in these areas that would otherwise have the potential to impact water resource conditions. Under Alternative 3, closing PHMA to fluid mineral leasing, saleable minerals, and nonenergy minerals would reduce potential impacts on water resource conditions, such as surface disturbance, associated with mineral development as described under the *Nature and Types of Effects*. Effects would be reduced to a greater extent than those under Alternative 1. This is because areas closed to leasing could not be developed at any point. Recommendation to withdraw PHMA from location and entry under the US mining laws would not restrict any activities and therefore would have no impact on water resource conditions. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 3, PHMA would be designated ROW exclusion for wind and solar energy development. Prohibiting wind energy development would eliminate the likelihood for impacts on water resource conditions from changes in land protected from or open to these surface-disturbing activities in these areas.

Because many water-consuming activities would be restricted, Alternative 3 is also likely to result in increased water retention through improved infiltration across the landscape. Restrictions from Alternative 3 would reduce surface disturbances that cause runoff and erosion, improving the likelihood of more waters fully supporting beneficial uses and maintaining or increasing the stream miles meeting state and federal water quality standards and designated beneficial uses.

New infrastructure development would be substantially limited compared with Alternative 1. All PHMA would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated ROW corridors. The inability to site ROWs in PHMA would decrease the potential for impacts on water resource conditions associated with changes in land open to ROW development as described under the

Nature and Type of Effects. However, the inability to site ROWs in PHMAs could lead to longer ROW routes to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting on water resource conditions outside of PHMA and may result in increased impacts on water resource conditions on adjacent state, tribal, or private lands.

GRSG Management

Alternative 3 would have more restrictions and result in fewer areas treated when compared with Alternative 1. Under these restrictions, impacts on water resource conditions as described under the *Nature and Type of Effects* would be more prone to impacts from potential wildfires in those areas.

10.15.5 Alternative 4

Livestock Grazing Management

Under Alternative 4, same as Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA, except for all or portions of 13 key RNAs in Oregon that may be fully or partially unavailable for grazing. Under Alternative 4, same as Alternative 1, the BLM would maintain its focus on monitoring and renewing grazing activities in PHMA areas. Under Alternative 4, site-specific management actions would continue to play a crucial role in determining the impacts on water resource conditions resulting from changes in livestock grazing as described under the *Nature and Type of Effects*. These actions would strive to minimize concentrated compaction and aim to maintain or improve water resource conditions, thereby mitigating effects on water resource conditions as described under the *Nature and Type of Effects*. Under Alternative 4, to align with land health standards and GRSG habitat objectives, the BLM Authorized Officer would retain the authority to include or adjust permit terms and conditions within the areas available for livestock grazing. The emphasized flexibility under Alternative 4, compared with Alternative 1, would help ensure that grazing practices remain in compliance with established guidelines and contribute to minimizing local impacts on water resource conditions resulting from changes in livestock grazing as described under the *Nature and Types of Effects*.

Wild Horse and Burro Management

Under Alternative 4, wild horse and burro impacts would be similar to Alternative 1 with the direction to remove SFAs. Impacts to water resources from wild horses and burros would be similar to was described in Alternative 1 and Alternative 2 with the exception of having reference to GHMA in Utah not being removed. Site-specific management actions would also address the impacts on water resource conditions from overpopulated wild horse and burro areas, which affect water quality through overgrazing and contamination.

Management of Surface-disturbing Activities

Alternative 4, compared with Alternative 1, would introduce additional management actions specifically addressing fluid mineral leasing and development within GRSG Habitat Management Areas (PHMA, GHMA, IHMA). Under Alternative 4, the BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Furthermore, Alternative 4 emphasizes the management of already leased areas for fluid minerals, including the application of lease stipulations, minimization measures, and compliance with NEPA. Alternative 4 would minimize impacts on water resource conditions as describes under the *Nature and Type of Effects* by promoting project designs that avoid, minimize, reduce, rectify, and mitigate for direct and indirect impacts.

Alternative 4 would direct the exclusion of PHMA for utility-scale wind and solar projects and designate IHMA as exclusion within 3.1 miles from active leks, with the remaining IHMA areas being avoidance. Avoidance areas would also be designated within 0.5 miles of PHMA/IHMA to address indirect impacts. GHMA would be avoidance for utility-scale wind/solar projects.

Under Alternative 4, PHMA/IHMA would be avoidance for major ROWs, and areas within 0.5 miles of PHMA/IHMA would also be avoidance. GHMA would be avoidance within breeding/nesting/limited-seasonal habitats, or entirely if not mapped, while designated corridors remain open. These modifications aim to protect water resource conditions and the GRSG habitat while allowing for managed development in specific areas, considering the impacts described under the *Nature and Types of Effects*.

GRSG Management

Alternative 4 would introduce specific provisions that differ from Alternative 1 regarding potential for wildfire, focusing on the impacts on water resource conditions for GRSG. That is, under Alternative 4, there would be a 3% cap within the HAF fine scale habitat selection area in PHMA. These measures under Alternative 4 aim to manage and minimize disturbance, preserve vegetation communities, and mitigate the potential for further degradation, while ensuring the conservation of water resource conditions and considering the impacts described under the *Nature and Types of Effects*.

10.15.6 Alternatives 5 and 6

Livestock Grazing Management

Under Alternatives 5 and 6, same as Alternative 1, livestock grazing would generally remain available in PHMA, IHMA, and GHMA for GRSG, except for certain RNAs in Oregon that may be partially or entirely unavailable for grazing pending final determinations. This precautionary measure aims to maintain critical GRSG habitat and associated water resource conditions in Oregon so that impacts described under the *Nature and Types of Effects* would be minimized.

In contrast to Alternative 1, Alternatives 5 and 6 introduce a targeted approach for the inclusion of thresholds and responses. Priority areas with the greatest potential to impact GRSG if suitable habitat conditions were not met would be identified for the implementation of thresholds and responses. This proactive conservation approach, compared with Alternative 1, would focus efforts on these priority areas, promoting the establishment of suitable habitat and thus minimizing impacts on water resource conditions as described under the *Nature and Type of Effects*.

Wild Horse and Burro Management

Under Alternatives 5 and 6, wild horse and burro impacts to water resources within the decision area would be similar to what is described in Alternative 1.

Management of Surface-disturbing Activities

Alternatives 5 and 6 introduce additional management actions compared with Alternative 1, specifically focusing on fluid mineral leasing and development within GRSG HMAs. The BLM would evaluate parcels identified in Expressions of Interest within GRSG habitat management areas giving preference to lands that would not result in impairing habitat suitability and proper function. Alternatives 5 and 6 would include management of areas already leased for fluid minerals, emphasizing the application of lease stipulations, minimization measures, and compliance with NEPA. Alternatives 5 and 6, compared with Alternative 1, would help minimize impacts on water resource conditions as described under the *Nature and Type of Effects* by promoting project designs that avoid, minimize, reduce, rectify, and mitigate for direct and indirect impacts, while considering site-specific considerations and project specific COAs. Moreover, Alternative 5

would expand upon the management actions in Alternative 1 to strike a balance between resource development and the conservation of GRSG habitat, connectivity, and impacts on water resource conditions.

Regarding wind and solar development, Alternatives 5 and 6 would introduce notable changes compared with Alternative 1. PHMA would be designated as avoidance for utility-scale wind and solar projects, prioritizing the protection of GRSG habitat and, in turn, reducing the impacts on water resource conditions as described under the *Nature and Type of Effects*. In contrast, GHMA would remain open for utility-scale wind and solar development, accompanied by specific minimization measures to mitigate potential impacts on water resource conditions as described under the *Nature and Type of Effects*. The designated corridors would be retained to accommodate transmission infrastructure. These modifications in Alternative 5 aim to conserve the GRSG habitat and strike a balance between renewable energy development and the preservation of water resource conditions.

Regarding major transmission ROWs, Alternatives 5 and 6 would introduce notable changes compared with Alternative 1. PHMA would be designated as avoidance for major ROWs, prioritizing the protection of GRSG habitat and, in turn, reducing the impacts on water resource conditions as described under the *Nature and Type of Effects*. In contrast, GHMA would remain open for major ROW development, accompanied by specific minimization measures to mitigate potential impacts on water resource conditions as described under the *Nature and Type of Effects*. The designated corridors would be retained to accommodate transmission infrastructure. These modifications in Alternative 5 aim to conserve the GRSG habitat and strike a balance between ROW development and the preservation of water resource conditions.

GRSG Management

Alternatives 5 and 6 would introduce provisions that slightly deviate from Alternative 1 concerning the potential for wildfire in relation to impacts on water resource conditions as described under the *Nature and Type of Effects*. That is, Alternatives 5 and 6 would entail different disturbance caps within the project analysis area of PHMA, depending on the state. In Wyoming and Montana, the cap would be set at 5%, while in other states, the cap would be 3%, limited to infrastructure only. Furthermore, a 3% cap on infrastructure would be implemented within the HAF fine scale habitat selection area in PHMA. Moreover, there would be no additional disturbance cap, but there are two scales of analysis. These measures under Alternatives 5 and 6, compared with Alternative 1, would aim to improve disturbance management, preserve vegetation communities, and mitigate potential degradation, while ensuring the conservation of water resource conditions for the GRSG across different states and specific boundaries.

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 10.19, 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.

10.16.2 Impacts Common to All Alternatives

Under all alternatives, the BLM would continue to adhere to the existing laws, such as the National Historic Preservation Act, and cultural resource related policy like that found in the BLM manuals and handbooks, such as Manual 8100 The Foundations for Managing Cultural Resources (BLM 2004b). This would generally act to protect culturally significant resources from impacts related to ground-disturbing activities, alterations to setting, and vandalism or unauthorized collection. It would also contribute to mitigating unavoidable impacts to cultural resources through various strategies. These might involve the collection of scientific data during cultural resource inventories or excavations, as well as in situ preservation to minimize physical disturbance and avoidance measures to guide activities away from sensitive areas. The BLM would continue to identify and manage cultural resources on a programmatic and project specific level. Additionally, continued consultation and cooperation with State Historic Preservation Offices and Native American Tribes would allow information on cultural properties and cultural landscapes to continue to be compiled and concerns regarding sensitive cultural resources such as TCPs to be addressed. This would enable better future management and protection of the integrity of these resources.

10.16.3 Alternative 1

GRSG Management

Under Alternative 1, HMAs and SFAs would be designated in GRSG habitat. In all states, a disturbance cap ranging from 3 to 5% would be implemented within PHMA. In Wyoming, a 5% cap is made at the project area scale and includes disturbance from wildfire and agriculture. In all other states (Colorado, Montana, Idaho, Nevada, California, Oregon, Utah, North Dakota, and South Dakota) a 3% cap would not include wildfire or agriculture and the cap would apply not only at the project area scale but also at the biologically significant unit scale within PHMA. In Idaho the cap could be exceeded in utility corridors if it is a benefit to GRSG.

Management related to HMAs and SFAs under Alternative 1, including disturbance caps, would protect cultural resources in these areas from disturbance related impacts to varying degrees depending on the activity and location. While this would continue to reduce potential for impacts on cultural resources in HMAs, it is likely at least some of the development related impacts would be displaced to locations outside of HMA, exposing cultural resources in other areas to greater potential for impacts.

Minerals Management

Under Alternative 1, leasing of fluid minerals would be permitted within PHMAs (and IHMAs in Idaho), with NSO) stipulations. The NSO stipulations would reduce potential for ground disturbing activities, changes to site setting, and increases in access due to development activities within PHMAs and IHMAs.

Under Alternative 1, closure of PHMA and IHMA to saleable and nonenergy mineral development (with some limited exceptions) would reduce potential within PHMAs and IHMAs for ground disturbing activities, changes to site setting, and increases in access due to development activities.

Under Alternative 1, the BLM previously recommended that all SFAs be withdrawn from location and entry under US mining laws. Recommending areas for withdrawal from location and entry under the Mining Law

of 1872 does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Under Alternative 1 fluid, saleable, and nonenergy mineral development in GHMAs would be subject to a mixture of management measures intended to minimize impacts on GRSG including designation as open, controlled surface use, closed, or NSO within varying distance of GRSG leks. These measures would reduce potential for ground disturbing activities, changes to site setting, and increases in access to impact cultural resources within GHMAs, though not to the degree that the management described above for PHMAs and IHMAs would.

While restrictions from minerals management under Alternative 1 would reduce potential for impacts on cultural resources within HMAs and SFAs, it would also likely result in a shift of some of these activities to suitable areas outside of them where possible, increasing potential for impacts on cultural resources outside of HMAs and SFAs. Overall, restrictions from minerals management under Alternative 1 could make development more costly and difficult or prevent development that could not be relocated to a suitable area. This would continue to be generally protective of cultural resources across the planning area.

Renewable Energy Management

Under Alternative 1, PHMA would be excluded from wind energy development except in some Oregon counties where PHMA would be designated as avoidance and Wyoming, where all PHMA would be designated as avoidance or open if there would be no impact to GRSG. IHMA in Idaho would be designated as avoidance for wind energy development.

Under Alternative 1, PHMA would be excluded from solar energy development, except in Wyoming where solar energy development would not be addressed and in Oregon, where it would be designated as avoidance. IHMA would be designated as avoidance for solar energy development.

Under Alternative 1, GHMAs would be a mix of open, avoidance, and exclusion for wind and solar that would vary by state. Exclusion or avoidance of wind and solar energy development would reduce potential within these areas for ground disturbing activities, changes to site setting, and increases in access due to development.

Impacts on cultural resources from ground disturbance, alteration of setting, and increased access related to renewable energy development would be the same as those described under Nature and Type of effects. While excluding or avoiding renewable energy development within HMAs under Alternative 1 would reduce potential for impacts on cultural resources within these areas, it would likely result in a shift of these activities to suitable areas outside of HMAs, negatively impacting cultural resources outside of them. Overall, the restrictions on renewable energy development under Alternative 1 could make development more costly and difficult or prevent any uses that could not be relocated to a suitable area. This would continue to be generally protective of cultural resources across the planning area.

Lands and Realty Management

Under Alternative 1, all states would designate PHMA/IHMAs as avoidance for major and minor ROWs, except for Wyoming which would be open to minor ROWs with buffers and mitigation. This would reduce potential within designated PHMAs and IHMAs for ground disturbing activities, changes to site setting, and increases in access due to ROW development.

Under Alternative 1, GHMAs would be designated as avoidance for major ROW development in Colorado, California, Nevada, and Oregon. In Idaho and Utah GHMAs would be open to major ROWs with minimization measures, and Wyoming is open to major ROWs. All states would be open to minor ROW development with mitigation, except for Wyoming which would not require mitigation. This would reduce potential within GHMAs for ground disturbing activities, changes to site setting, and increases in access due to ROW development, though to a much lesser degree than ROW related management for PHMAs and IHMAs.

While excluding or avoiding ROW development within HMAs under Alternative 1 would continue to reduce potential for impacts on cultural resources within these areas, it would likely result in a shift of these activities to suitable areas outside of HMAs, negatively impacting cultural resources outside of them.

Livestock Grazing Management

Under Alternative 1, all PHMAs, IHMAs, and GHMAs would be available for livestock grazing except for in Oregon where some or all of RNAs would be unavailable. Livestock grazing would continue to create potential for impacts on cultural resources within these areas from ground disturbance like trampling and changes to site setting through vegetation changes.

Wild Horse and Burro Management

Under Alternative 1, in all states where wild horses and burros overlap with GRSG habitat, the BLM would continue to manage wild horse and burro populations within established AMLs and incorporate GRSG objectives into wild horse and burro management. Keeping wild horse and burro populations at established AMLs, and prioritized gathers to accommodate GRSG habitat objectives would keep wild horse and burro populations from increasing. Any reduction in AMLs from incorporation of GRSG objectives into wild horse and burro management could decrease wild horse and burro populations. Restrictions on wild horses and burros under Alternative 1 would maintain or decrease the current potential for surface disturbance and changes to site setting from wild horse and burro grazing, extending protection to cultural resources.

10.16.4 Alternative 2

GRSG Management

Under Alternative 2, the impacts on cultural resources from designating SFAs and HMAs within GRSG habitat would be similar to those described under Alternative 1, although SFAs in Utah, Wyoming, Nevada and Idaho would not be designated under Alternative 2. Under Alternative 2, the impacts on cultural resources from instituting a disturbance cap in GRSG habitat would be very similar to those described under Alternative 1, relevant differences being that in Utah the cap can be exceeded if it is a benefit to GRSG, and in Idaho the cap only applies at the BSU-scale, both of which could result in additional impacts from development beyond what would be seen under Alternative 1.

Similar to Alternative 1, management related to HMAs and SFAs under Alternative 2 would protect cultural resources in these areas from disturbance related impacts to varying degrees depending on the activity and location. The differences in GRSG management under Alternative 2 would reduce GRSG related restrictions in these areas that are protective of cultural resources.

Minerals Management

Under Alternative 2, impacts from fluid mineral management in PHMAs and GHMAs would be similar to those described for Alternative 1, except in Colorado PHMAs would not be closed to fluid mineral leasing and GHMAs would have NSO stipulations instead of closure. The increased potential for fluid mineral leasing

and associated activities in Colorado GRSG habitat from these changes would increase the potential for related impacts on cultural resources in these areas.

Under Alternative 2, impacts from saleable and nonenergy mineral management in PHMAs and GHMAs would be similar to those described for Alternative 1, except that in Idaho consideration of new free use permits would be allowed and in Nevada there would be exception criteria added to closure. The increased potential for saleable and nonenergy mineral development in Idaho and Nevada GRSG habitat would increase the potential for related impacts on cultural resources in these areas.

Under Alternative 2, the recommendation that all SFAs be withdrawn from location and entry under US mining laws (except in Montana, North Dakota, and South Dakota) would be removed. This removal would have no impact because withdrawals are initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA. Only the Secretary may withdraw lands through a Public Land Order.

Under Alternative 2, restrictions from minerals management would reduce potential for impacts on cultural resources within HMAs and SFAs and would also likely result in a shift of some of these activities to suitable areas outside of them where possible. This would increase potential for impacts on cultural resources outside of HMAs and SFAs. Overall, restrictions from minerals management under Alternative 2 could make development more costly and difficult or prevent uses that could not be relocated to a suitable area. This would be generally protective of cultural resources across the planning area.

Renewable Energy Management

Under Alternative 2, the impacts from solar and wind energy management in PHMAs and GHMAs would be the similar to those described for Alternative 1, with some additional exception criteria added to exclusion and avoidance of HMAs in Nevada and California. These exception criteria would increase potential for ground disturbing activities, changes to site setting, and increases in access related to renewable energy development in these areas.

Lands and Realty Management

Under Alternative 2, the impacts from ROW management would be similar to those described for Alternative 1, with the addition of exception criteria for ROWs in PHMAs in Nevada. These exception criteria would increase potential for ground disturbing activities, changes to site setting, and increases in access related to ROW development in these areas.

Livestock Grazing Management

Under Alternative 2, the impacts from livestock grazing management would be similar to those described for Alternative 1. In Utah, Wyoming, and Nevada, the prioritization for review and processing of grazing permits in SFAs and PHMAs was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Under Alternative 2, the impacts from wild horse and burro management would be the same as those described for Alternative 1.

10.16.5 Alternative 3

GRSG Management

Under Alternative 3, all areas managed for GRSG would be designated PHMAs, with some states considering expanding HMA boundaries to include areas of adjacent non-habitat, unoccupied historic GRSG habitat, or areas with potential to become GRSG habitat as PHMAs. Under Alternative 3, The disturbance cap is 3%, applies at the project scale, and in accordance with the HAF (Stiver et al. 2015) Fine Scale boundaries range wide. Of note, under Alternative 3, the disturbance cap would include wildfire and agriculture as well as infrastructure, greatly increasing the amount of potential disturbance included in the disturbance calculation for those states that do not do so under Alternative 1 (all but Montana and Wyoming)

Under Alternative 3, the HMA designation scheme would create the highest acreage of PHMA, and along with the most robust version of the disturbance cap, offers the highest level of protection to cultural resources in HMAs from GRSG related restrictions among the alternatives.

Minerals Management

Under Alternative 3, closure of PHMAs to fluid minerals, saleable minerals, and nonenergy minerals related development offers the highest level of related protections to cultural resources from GRSG related restrictions among the alternatives.

Under Alternative 3, the recommendation that all PHMAs be withdrawn from location and entry under US mining laws would be made. This recommendation would have no impact on ground disturbing activities, changes to site setting, or access due to related locatable mineral development because withdrawals are initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA. Only the Secretary may withdraw lands through a Public Land Order.

Renewable Energy Management

Under Alternative 3, impacts on cultural resources from ground disturbance, alteration of setting, and increased access related to renewable energy development would be the same as those described under Nature and Type of effects. Only PHMA would be designated under Alternative 3, and all designated PHMA would be excluded from solar and wind energy development without exceptions. These exclusions would decrease potential in designated HMAs for ground disturbing activities, changes to site setting, and increases in access due to solar and wind energy related development the most among alternatives.

Lands and Realty Management

Under Alternative 3, PHMA would be excluded from ROW development outside of designated corridors. These exclusions would decrease potential for ground disturbing activities, changes to site setting, and increases in access due to ROW related development inside PHMAs, and would designate the most acreage of PHMA among alternatives. However, the exclusion of ROW development in PHMAs could lead to creation of longer ROW routes to get around closed areas. Longer ROW routes would increase potential for ground disturbing activities, changes to site setting, and increases in access outside of PHMAs.

Livestock Grazing Management

The management of PHMA as unavailable for livestock grazing would cause the greatest decrease in potential for related impacts on cultural resources among alternatives. However, removal of all grazing could reduce the removal of fine fuels across the landscape, making the decision area potentially at higher risk of a large-scale wildfire that could damage or destroy cultural resources located at or near the surface.

Wild Horse and Burro Management

The removal of wild horses and burros would decrease the potential for related impacts on cultural resources within PHMAs the most among alternatives.

10.16.6 Alternative 4

GRSG Management

Under Alternative 4, the BLM would consider adjustments to HMA boundaries from the 2015 and 2019 amendments based on new information such as updated science and mapping that could result in expansion of HMAs, removal of current HMA designation, or re-categorization of HMAs. Under Alternative 4, the impacts on cultural resources from designating HMAs within GRSG habitat would likely be similar to those described under Alternative 1, although SFAs would not be designated under Alternative 4.

Under Alternative 4, the disturbance cap in PHMA (and IHMA in Idaho) for all states would be 3% for new and pre-existing authorizations at the project scale and also within HAF fine scale habitat selection area, and would apply only to infrastructure (not to wildfire or agriculture). Impacts from the disturbance cap as instituted under Alternative 4 would be similar to those under Alternative 1.

Minerals Management

Similar to Alternative 1, under Alternative 4 fluid mineral leasing management would seek to minimize impacts on GRSG through reduction of habitat fragmentation and loss, which would be generally protective of cultural resources in GRSG habitat. Under Alternative 4 a greater number of waivers, exceptions, and modifications for fluid minerals leasing applied across a larger portion of the planning area could enable a greater degree of development in HMAs than would be seen under Alternative 1, leading to increased potential for impacts on cultural resources related to mineral development, as described in *Nature and Type of Effects*.

Renewable Energy Management

Under Alternative 4, PHMA would be managed as exclusion for utility scale wind and solar development while IHMA would be managed as exclusion for utility scale wind and solar development within 3.1 miles of active leks, with the rest of IHMA managed as avoidance. Unique to Alternative 4, all areas within 0.5 miles of PHMA or IHMA would be managed as avoidance for utility scale wind and solar development. Under Alternative 4, the overall impacts on cultural resources from managing HMAs as exclusion and avoidance areas for wind and solar energy development would be similar to those described for Alternative 3.

Lands and Realty Management

Under Alternative 4, PHMA and IHMA as well as a 0.5 mile buffer around them would be designated as avoidance for major transmission ROWs. GHMA would also contain at least some areas designated as ROW avoidance, depending on habitat mapping at the state level. Despite the addition of a 0.5-mile ROW avoidance buffer on PHMA and IHMA, the lack of major ROW exclusions under Alternative 4 could result in shorter ROWs, reducing the overall acreage where cultural resources would potentially be impacted across the planning area compared to Alternative 1.

Livestock Grazing Management

Impacts from livestock grazing management would be the same as described under Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management would be the same as described under Alternative 1.

10.16.7 Alternative 5

GRSG Management

Under Alternative 5, the BLM would consider adjustments to HMA boundaries from the 2015 and 2019 amendments based on new information such as updated science and mapping that could result in expansion of HMAs, removal of current HMA designation, or re-categorization of HMAs. Under Alternative 5, the impacts on cultural resources from designating HMAs within GRSG habitat would likely be similar to those described under Alternative 1, although SFAs would not be designated under Alternative 5.

Under Alternative 5, the disturbance cap in PHMA (and IHMA in Idaho) for all states would be 3% for new and pre-existing authorizations within HAF fine scale habitat selection area, and would apply only to infrastructure (not to wildfire or agriculture). In Wyoming and Montana, a 5% cap is made in PHMA at the project scale and includes disturbance from wildfire and agriculture. In all other states (Colorado, Montana, Idaho, Nevada, California, Oregon, Utah, North Dakota, and South Dakota) a 3% cap at the project scale would not include wildfire or agriculture related disturbance. Impacts on cultural resources from the disturbance cap as instituted under Alternative 4 would be similar to those under Alternative 1.

Minerals Management

Under Alternative 5, impacts on cultural resources from fluid mineral management would be similar to those described under Alternative 4. The management of fewer acres as NSO under Alternative 5 could make some cultural resources more susceptible to impacts from fluid mineral exploration and development as described in the *Nature and Type of Effects*.

Renewable Energy Management

Under Alternative 5, Impacts on cultural resources related to renewable energy development would be the same as those described under Nature and Type of Effects. Under Alternative 5, PHMA and IHMA would be managed as avoidance for utility scale wind and solar development while GHMA would be open to it. Impacts on cultural resources within HMAs would be greater than under Alternative 1 due to the lack of HMA designated as solar and wind energy exclusion areas, however overall likelihood of these impacts within the planning area are likely to be the similar to that under Alternative 1, since impacts on cultural resources due to renewable energy development may only be displaced instead of avoided entirely.

Lands and Realty Management

Under Alternative 5, impacts on cultural resources related to ROW avoidance would be the same as those described under Nature and Type of effects. The designation of GHMA as open to major ROWs and lack of major ROW exclusions under Alternative 5 could result in shorter ROWs compared to management under all the other alternatives, since all other alternatives include greater ROW avoidance or exclusion designations. Shorter ROWS would reduce the overall area where cultural resources could potentially be impacted by ROWs across the planning area compared to all other alternatives.

Livestock Grazing Management

Under Alternative 5, the impacts from livestock grazing management would be the same as those described for Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be the same as those described for Alternative 1.

10.16.8 Alternative 6

Impacts on cultural resources under Alternative 6 would be similar to impacts under Alternative 5 except for the designation of ACECs. ACECs designated for the benefit of GRSG under Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, nonenergy minerals, saleable minerals and mineral materials as well as development of major ROWs, wind and solar within the ACECs, which would be protective of cultural resources inside these areas. The overall likelihood of impacts on cultural resources from various types of development within the planning area would be similar to that under Alternative 5 since impacts on cultural resources may only be displaced outside of ACECs instead of avoided entirely.

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.

10.17.2 Impacts Common to All Alternatives

Under all alternatives the BLM would continue to manage BLM-administered lands in a manner that accommodates Native American religious traditions, practices, and beliefs as guided by directives contained in the BLM Manual 1780, BLM Handbook 1780-1, American Indian Religious Freedom Act (42 USC 1996), Native American Graves Protection and Repatriation Act (25 USC 3001), Executive Order 13007 (Indian Sacred Sites), and Executive Order 13084 (Tribal Consultation), Secretarial Order 3317, DOI Policy on Consultation with Indian Tribes (December 1, 2011), and Joint Secretarial Order 3403, on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters (November 21, 2022). All alternatives allow for the appropriate tribal governments to consult on a case-by-case basis on undertakings on BLM-administered lands that could affect Native American concerns. The BLM would continue to identify, protect, and preserve tribal assets, treaty rights, sacred/religious sites, or special use areas through site- and project-specific modification or mitigation on a case-by-case or project-by-project consultation basis that could affect Native American concerns.

Under all alternatives, actions that provide protections for GRSG or its habitat by limiting access into areas or excluding surface-disturbing activities, such as NSO and restrictions on surface and vehicle use would protect cultural resources from effects due to surface disturbance, erosion, effects on setting and access leading to vandalism, inadvertent damage, and unauthorized collection of cultural resources. These actions could also increase tribal opportunities to maintain specific traditional practices and values such as traditional plant gathering, hunting animals including GRSG, and the role played by GRSG in oral traditions and cultural practices such as observing lekking behavior as described in the Nevada and Northeastern California Greater Sage-Grouse Proposed Land Use Plan Amendment and Final Environmental Impact Statement (BLM 2015) if the current leasing of nonenergy minerals has led to decreases in GRSG populations.

10.17.3 Alternative 1

GRSG Management

Under Alternative 1, GRSG habitat would be separated into SFAs, PHMAs, IHMAs, and GHMAs. Restrictions to land use and surface-disturbing activities would occur within each HMA and SFA, depending on the classification. Corresponding management actions, including lek buffers, required design features, fluid mineral leasing prioritization, and habitat objectives, would provide a hierarchy of potential conditions to minimize effects in HMAs which could stabilize or increase GRSG populations in the future. These management goals and objectives could lead to increased opportunities for tribes to maintain traditional cultural practices and values, such as observing lekking behavior. However, use of Sagebrush Focal Areas (SFAs) and sagebrush-dominated vegetation areas in HMAs to the restrict development has the potential to push development into other vegetation regimes where cultural resources and areas of tribal interest may also exist. For example, in northwest Colorado, there are known concentrations of archaeological resources in pinyon-juniper vegetation areas that could face increased potential for impacts if ground-disturbing activities are directed into those areas when sagebrush-dominated areas are more restrictive. In Nevada and California, tribes have expressed concern for access to traditional pine nutting areas that could be similarly impacted if development is pushed to other vegetative areas in preference for SFA conservation. However, project-specific Section 106 compliance and tribal consultation should mitigate the effects of development on BLM-administered lands outside of sagebrush-dominated areas.

Lands and Realty Management

Under Alternative 1, the BLM would manage and minimize effects of land use actions on PHMA and GHMA; however, it would allow for corridors and ROWs that result in a net conservation gain for GRSG. Tribes would be able to maintain traditional practices by accessing pine nutting areas and observing lekking behavior.

Restricting new development and land use authorizations near leks would likely maintain traditional tribal cultural practices and values. Cultural resources important to tribes could be impacted by the development of transmission lines within new and existing utility corridors, specifically surface disturbances from construction of poles, roads, and ancillary features, and visual impacts to the setting.

All states would have a 3% disturbance cap applied to land use activities other than wildfire and agriculture, except MT and WY, which would have a 5% cap that would include wildfire and agriculture. The 3% cap would be calculated at both the BSU-scale and at proposed project analysis area within PHMA, though in ID, the cap could be exceeded in utility corridors. Including caps at both project and BSU scales in the 3% states would reduce disturbance on both the local and landscape scales, therefore, provide protection for resources of tribal interest. A higher disturbance cap in MT and WY calculated at only the project-scale could lead to greater levels of disturbance within a project area, and therefore greater potential direct disturbances to tribally-important resources and the potential for greater cumulative disturbances across multiple projects.

Renewable Energy development is excluded in PHMAs in all states except WY where PHMAs are avoidance or open if there is no impact to GRSG. IHMAs and certain areas in OR would use GRSG avoidance rather than exclusion. GHMAs would be a mix of open, avoidance, and exclusion for wind and solar by state. Allowing renewable energy development within certain GRSG core habitat areas could adversely impact cultural resources and access for tribal cultural practices in those areas.

Minerals Management

Leasing of fluid minerals would be allowed in PHMAs and ID IHMAs, subject to NSO stipulations and/or seasonal restrictions. Allowing fluid mineral leasing would create surface disturbance that could impact cultural resources important to tribes in those areas. However, NSO stipulations on new leases would protect PHMAs from surface-disturbing activities, which could protect cultural resources and increase the opportunities for tribes to participate in traditional cultural practices, if the NSO stipulations were to increase or stabilize GRSG populations.

Closing PHMA to saleable and nonenergy minerals would protect cultural resources important to tribes and increase the opportunities for tribes to participate in traditional cultural practices if the closures were to increase or stabilize GRSG populations.

Livestock Grazing

Management of livestock grazing in PHMA and GHMA could decrease tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if those current management practices have led to decreases in GRSG populations.

Wild Horse and Burro Management

Management of wild horses and burros in PHMA and GHMA could decrease tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if those current management practices have led to decreases in GRSG populations.

10.17.4 Alternative 2

GRSG Management

Impacts from designating GRSG habitat as SFAs, PHMAs, IHMAs, and GHMAs would be similar as to those described for Alternative 1. However, some SFAs would be removed in UT, WY, NV, and ID. Removing SFAs in UT, WY, NV, and ID would reduce protections to GRSG and habitat, which could lead to decreased

opportunities for tribes to maintain traditional cultural practices and values, such as observing lekking behavior.

Lands and Realty Management

Impacts from ROW management would be the same as described for Alternative 1 (with additional exception criteria in NV/CA). The additional exception criteria for ROW and renewable energy in NV/CA could increase the potential for impacts to cultural resources and traditional uses from surface-disturbing activities, though the criteria would likely avoid impacts to GRSG. Impacts from disturbance caps at 3%, and 5% in MT and WY, would be similar to Alternative, though the caps could be exceeded in both ID and UT under certain conditions which could pose a higher risk of potential impacts to resources of tribal interest in those states.

Minerals Management

Impacts from fluid mineral management in PHMAs and GHMAs would be the same as described for Alternative 1, except in CO PHMAs would have no closed areas and CO GHMAs would have NSO in place of closed areas. The exposure of areas in CO to fluid mineral leasing could increase the risk of potential impacts to cultural resources and decrease opportunities for tribes to maintain traditional cultural practices and values in areas where fluid mineral leasing occurs.

Impacts from saleable and nonenergy mineral management in PHMAs and GHMAs would be the same as described for Alternative 1, except in ID IHMAs where new free use permits for saleable minerals would be considered and NV PHMAs would include exception criteria to closure for both saleable and nonenergy minerals. These actions could expose cultural resources to increased risk of potential impacts from surface-disturbing activities and decrease opportunities for tribes to maintain traditional cultural practices and values.

Removing the recommendation for withdrawal of the SFAs from location and entry under the Mining Law of 1872 in all states (except in MT/DK, which did not have a 2019 amendment) would have no impact on how surface-disturbing activities would impact cultural resources and would not impact GRSG disturbance and habitat alterations/degradation, nor would it impact opportunities for tribes to maintain traditional cultural practices and values. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Livestock Grazing Management

Impacts from domestic livestock grazing management would be the same as described for Alternative 1. In UT, WY, and NV, the prioritization for review and processing of grazing permits was removed; however, the BLM would still have the authority to prioritize staff time and budget to identify areas that aren't meeting land health standards and implement corrective actions in areas with the greatest GRSG habitat value.

Wild Horse and Burro Management

Impacts from wild horse and burro management would be the same as described for Alternative 1.

10.17.5 Alternative 3

GRSG Management

Under Alternative 3, the highest level of conservation for GRSG would be adopted with all areas managed for GRSG as PHMAs and establish management goals and objectives for specific resources in PHMA that could stabilize or increase GRSG populations in the future. If successful, these management goals and objectives could lead to increased opportunities for tribes to maintain traditional cultural practices and values such as observing lekking behavior.

Lands and Realty Management

New development would be substantially limited compared with Alternatives 1 and 2. All PHMAs would be excluded from new ROW authorizations. New linear ROWs would be allowed only in designated corridors. The potential for habitat degradation and fragmentation within the PHMAs would be reduced and this would result in increased opportunities for tribes to maintain traditional practices as well as increase protection of cultural resources important to tribes in those areas from surface-disturbing activities by reducing travel and access, which in, turn could reduce vandalism and collection. However, the inability to site ROWs in PHMAs could lead to longer ROW routes in order to bypass closed areas. Longer routes would increase surface disturbance and other impacts of ROW siting, resulting in more areas that would be exposed to ground disturbance, erosion, and impacts from increased access outside of PHMAs. A 3% disturbance cap would be applied to pre-existing land-use authorization including wildfire and agriculture at multiple scales and with now exceptions, offering a higher level of protection to resources of tribal interest than alternatives 1 and 2.

Under Alternative 3, PHMAs in all states would be ROW exclusion areas for wind and solar energy development. Alternative 3 would offer more protection from renewable energy development than under Alternatives 1 and 2 because more areas would be excluded from renewable energy development with no exceptions. Excluding wind energy development in GRSG priority and general habitat areas would reduce surface disturbance and visual impacts to cultural resources important to tribes in those areas as well as preserving opportunities for tribes to maintain traditional cultural practices.

Minerals Management

Closing PHMAs in all states to fluid mineral leasing, saleable minerals, and nonenergy minerals would reduce potential for impacts to GRSG and habitat to a greater extent than Alternatives 1 and 2. This is because areas closed to leasing could not be developed at any point. Closing PHMAs to mineral leasing and development would protect cultural resources important to tribes from surface-disturbing activities as well as subsurface activities (e.g., directional drilling). GRSG would not be exposed to disruption that is often associated with the noise and human activity that accompanies construction, development, or production activities, preserving opportunities for tribes to maintain traditional cultural practices.

Recommending PHMAs for withdrawal from location and entry under the US mining laws would have no impact on tribal opportunities to practice traditional cultural behavior and values such as observing lekking behavior if this management strategy stabilizes or increases GRSG populations. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA.

Livestock Grazing Management

Under Alternative 3, all PHMA would be unavailable for domestic livestock grazing that would increase opportunities for tribes to maintain traditional practices, such as observing lekking behavior, if this grazing strategy stabilizes or increases future GRSG populations. Prohibiting livestock grazing within GRSG priority habitat could also protect cultural resources important to tribes in these areas from damage by livestock trampling. However, removal of all grazing could reduce the removal of fine fuels across the landscape, making the decision area potentially at higher risk of a large-scale wildfire that could damage or destroy tribal interests. Additionally, this alternative may decrease economic revenue to tribes holding grazing permits if their current AUMs are reduced.

Wild Horse and Burro Management

Removing wild horses and burros in those PHMAs with existing herd management areas in all states would increase habitat quality for wildlife, including GRSG, as described in **Section 4.2**. This increase in GRSG habitat quality would increase opportunities for tribes to maintain traditional practices.

10.17.6 Alternative 4

GRSG Management

Under Alternative 4, the BLM would consider adjustments to HMA boundaries from the 2015 and 2019 amendments based on new information such as updated science and mapping that could result in expansion of HMAs, removal of areas currently in HMA, or re-categorization of HMA prioritization. Impacts to resources of tribal interest from HMA designations under Alternative 4 are expected to be similar to alternatives 1 and 2.

Lands and Realty Management

Under Alternative 4, impacts from managing PHMAs in all states and ID IHMAs as ROW avoidance areas would be similar to those described for Alternative 1.

Impacts from applying a 3% disturbance cap under Alternative 4 would be similar as to those described for Alternative 3, however, the cap would apply to both existing and proposed infrastructure authorizations and wildfire and agriculture would not be included in the disturbance calculation. As a result, the level of possible disturbance to resources of tribal interest from other sources (energy development, roads, RPWs, etc.) would be relatively higher than if wildfire and agriculture were included in the disturbance calculation.

Impacts from managing PHMAs in all states as ROW exclusion areas for utility-scale wind and solar energy development would be similar to those described for Alternative 3. Unique to Alternative 4, all areas within 0.5 miles of PHMA or IHMA would be managed as avoidance for utility scale wind and solar development. However, since PHMAs would apply to a smaller area under this alternative, the extent of protection from disturbance associated with from renewable energy development would be less.

Minerals Management

Under Alternative 4, fluid mineral leasing management would seek to minimize impacts on GRSG through reduction of habitat fragmentation and loss, which would be generally protective of cultural resources and other tribal interests in GRSG habitat. Under Alternative 4 a greater number of waivers, exceptions, and modifications for fluid minerals leasing applied across a larger portion of the planning area could enable a greater degree of development in HMAs than would be seen under Alternative 1.

Livestock Grazing Management

Impacts under Alternative 4 would be the same as those described under Alternative 1.

Wild Horse and Burro Management

Impacts under Alternative 4 would be the same as those described under Alternative 1.

10.17.7 Alternative 5

GRSG Management

Under Alternative 5, impacts to tribal interests would be similar to Alternative 4 with the additional consideration of adjustments to HMAs to balance multi-use opportunities, which has the potential to produce impacts on tribal interests since HMAs would cover a smaller area under Alternative 5.

Lands and Realty Management

Under Alternative 5, impacts from managing PHMAs in all states and ID IHMAs as ROW avoidance areas and applying minimization measures where major ROWs cannot be avoided would be similar to those described for Alternative 4. GHMA would be open to major ROW development with minimization measures of managing the severity of a project impact at a specific location. Potential impacts on areas of tribal interest would be similar to those as described under Alternative 4, but greater in magnitude due to GHMA being managed as open to major ROW development.

Impacts from applying a 3% disturbance cap under Alternative 5 would be the same as described for Alternative 4, except in WY and MT that would have a 5% disturbance cap at the project scale. Impacts from exceeding the 3% disturbance cap under certain conditions would be similar to those described for Alternative 4, but more exceptions would be allowed, which may result in increased development and potential disturbance to resources of tribal interest.

Minerals Management

Under Alternative 5, impacts on areas of tribal interest from fluid mineral management would be identical to those described under Alternative 4.

Livestock Grazing Management

Impacts under Alternative 5 would be the same as those described under Alternative 1.

Wild Horse and Burro Management

Impacts from wild horse and burro management under Alternative 5 would be similar to those described for Alternative 1. Management within established AMLs could increase in GRSG habitat quality, which could increase opportunities for tribes to maintain traditional practices in some areas.

10.17.8 Alternative 6

Impacts on areas of tribal interest under Alternative 6 would be similar to impacts under Alternative 5 except for the designation of ACECs. ACECs designated for the benefit of GRSG under Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, nonenergy minerals, saleable minerals and mineral materials as well as development of major ROWs, wind and solar within the ACECs, which would lessen the potential for impacts to areas of cultural interests in these areas.

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. The types of actions that can result in these impacts are discussed in more detail in **Section 4.18.1**, Nature and Type of Effects.

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 the 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.

10.18.2 Alternative 1

Under Alternative 1, fluid minerals would be managed within PHMA and IHMA as open with an NSO stipulation in most states with the exception that PHMA in Colorado would be closed to fluid mineral leasing within 1 mile of leks. Fluid mineral leasing in PHMA within Wyoming and Montana would also be subject to density and disturbance limits. Fluid mineral leasing within GHMA would be managed as closed within one mile of leks in Colorado and Oregon. Fluid minerals would be managed with an NSO stipulation in GHMA with varying distances from leks depending on the state. Fluid minerals would also be managed within GHMA as controlled surface use in California, Idaho, Nevada, Oregon, and Wyoming. Areas open to fluid minerals leasing and development would not provide protection to wilderness characteristics because development and infrastructure related to those actions would impact wilderness characteristics as discussed above under *Nature and Type of Effects*.

PHMA and IHMA would be managed as closed to saleable minerals in most states and closed to new development of nonenergy leasable minerals. These closures would protect the naturalness of the lands with wilderness characteristics. Lands in GHMA would have minimization measures for saleable mineral and nonenergy leasable mineral development, which would minimize impacts, but would not prevent impacts from saleable mineral development on lands with wilderness characteristics.

SFAs were recommended for withdrawal from mineral location and entry within PHMA. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. Where lands with wilderness characteristics intersect with the areas open for mineral development, there is no certainty for protection of these wilderness characteristics.

PHMA and IHMA would be managed as ROW avoidance areas for major and minor ROWs. However, Wyoming would be open to ROWs with buffers and mitigation. Major ROW development within GHMA would vary by state. For minor ROWs, GHMA would remain open to ROW development with mitigation for all states, except for Wyoming, which does not require mitigation. ROW activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the experience of solitude, as described above under *Nature and Type of Effects*. Due to screening criteria, conditions for development, and required mitigation, applicants may find it easier to site their development outside of GRSG habitat, thereby leading to some additional protection of lands with wilderness characteristics within GRSG habitat.

Livestock grazing would be available in GRSG HMAs, except in Oregon where all or portions of 13 key RNAs would be unavailable. Impacts to wilderness characteristics would be the same as those described under *Nature and Type of Effects*.

10.18.3 Alternative 2

Under Alternative 2, impacts from management of fluid minerals on lands with wilderness characteristics would be similar as those described under Alternative 1. However, under Alternative 2, PHMA and GHMA within Colorado would not be managed as closed to fluid minerals, rather these areas would be managed as NSO within 1 mile of leks which would effectively provide the same protection to wilderness characteristics due to the lack of surface disturbance with this type of development.

Impacts from saleable minerals on lands with wilderness characteristics within PHMA and IHMA would be similar as those described under Alternative 1. However, under Alternative 2, Idaho would allow for consideration of new free use permits and Nevada would have exception criteria to the closed areas. Compared with Alternative 1, the free use permits, and exception criteria would allow for more impacts on lands with wilderness characteristics within PHMA and IHMA due to more areas allowing this surface disturbing activity. Impacts from saleable minerals and nonenergy minerals on lands with wilderness characteristics within GHMA would be the same as those described under Alternative 1.

The BLM would not recommend lands for withdrawal from locatable mineral entry within GHMA or PHMA. Recommending areas for closure to the mining laws for locatable exploration or development does not restrict any activities and therefore, such recommendation does not have any impacts. The Secretary proposes and makes withdrawals not through BLM land use planning but according to a separate process pursuant to section 204 of FLPMA. Where lands with wilderness characteristics intersect with the areas open for mineral development, impacts in these areas would be greater under this alternative compared with Alternative 1 due to no certainty for protection of wilderness characteristics.

PHMA would be managed similar to Alternative 1 for ROWs, except Nevada would have added exception criteria added which could allow for more impacts to wilderness characteristics under this alternative as described under *Nature and Type of Effects*. Impacts from ROWs on lands with wilderness characteristics would be the same as those described under Alternative 1 for GHMA.

Impacts from livestock grazing on lands with wilderness characteristics would be the same as those described under Alternative 1. In Oregon, livestock grazing would be available in all or portions of 13 key RNAs.

10.18.4 Alternative 3

Under Alternative 3, PHMA would be closed to fluid mineral leasing, saleable minerals, nonenergy leasable minerals, and recommended for withdrawal from locatable mineral entry providing the most protection from impacts described under *Nature and Type of Effects* to lands with wilderness characteristics than under any other alternative. However, a recommendation for withdrawal provides no protection to habitat. Withdrawals are initiated and considered not through land use planning but through a separate process outlined in section 204 of FLPMA.

PHMA would be managed as ROW exclusion areas which would result in the most protection of lands with wilderness characteristics compared to all other alternatives. ROW activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the experience of solitude, as described under *Nature and Type of Effects*. Precluding these types of activities would help protect wilderness characteristics.

Livestock grazing would be unavailable in PHMA which would result in the most indirect protection of lands with wilderness characteristics of all the other alternatives because lands with wilderness characteristics would not be subject to the types of impacts from livestock grazing that could reduce naturalness. In Oregon, key RNAs within PHMA would be unavailable for grazing with the same direct and indirect impacts as described under *Nature and Type of Effects*. However, removal of all grazing could reduce the removal of fine fuels across the landscape, making the decision area potentially at higher risk of a large-scale wildfire that could damage wilderness characteristics.

Management actions under Alternative 3 would have the overall greatest potential to maintain wilderness characteristics on lands with wilderness characteristics within PHMA when compared to all other alternatives. However, these management actions could lead to a buildup of fuels and increase the risk of wildfire. Wildfire would make affected areas less desirable for primitive recreation.

10.18.5 Alternative 4

Under Alternative 4, no changes to mineral resource use allocations would be made, but fluid mineral leasing would be managed to minimize potential for conflict and associated impacts from subsequent development in important habitats or connectivity areas. The evaluation of parcels and the consideration of development proximity, habitat significance, and potential would contribute to the preservation of naturalness in lands with wilderness characteristics as described under *Nature and Types of Effects.*

PHMA and IHMA would be managed as avoidance areas for major ROWs under this alternative. All areas within 0.5 miles of PHMA and IHMA would be managed as avoidance areas for ROWs to address indirect impacts to adjacent PHMA and IHMA. GHMA would be managed as avoidance areas within breeding, nesting, and limited-seasonal habitats where mapped. Impacts on lands with wilderness characteristics would be similar to those as described under Alternative 1, but lesser in magnitude due to the additional areas adjacent to HMAs being managed as avoidance areas for ROWs.

All GRSG HMAs would be available for livestock grazing, except in Oregon, where all or portions of 13 key RNAs would be unavailable. Livestock grazing would be managed toward meeting land health standards, which are informed by GRSG habitat objectives for Special Status Species. This alternative does not provide additional protections to lands with wilderness characteristics, as these lands were designated under existing

livestock grazing management. The purpose of livestock grazing is not to provide protection to lands with wilderness characteristics, and land health standards already exist under 43 CFR 4100, independent of such designations. New range improvement projects would be designed to enhance livestock distribution, and new structural range improvements would be placed in a way that minimizes impacts on GRSG and their habitat. This would limit the impacts on lands with wilderness characteristics from new range improvement projects as described under *Nature and Type of Effects*.

10.18.6 Alternative 5

Under Alternative 5, impacts from mineral resource use allocations on lands with wilderness characteristics would be the same as those described under Alternative 4.

PHMA and IHMA would be managed as avoidance areas for major ROWs under this alternative, but GHMA would be open to major ROW development with minimization measures of managing the severity of a project impact at a specific location. Impacts on lands with wilderness characteristics would be similar to those as described under Alternative 4, but greater in magnitude due to GHMA being managed as open to major ROW development.

Impacts from livestock grazing on lands with wilderness characteristics would be the same as those described under Alternative 4.

10.18.7 Alternative 6

Where lands maintained for wilderness characteristics overlap ACECs, management of these other areas could also indirectly protect wilderness characteristics due to the protective measures proposed for the other areas. These protective measures would include complementary management objectives, where lands with wilderness characteristics would be managed to protect them. This could offer some indirect protection of wilderness characteristics for units managed primarily for other resource considerations.

Under Alternative 6, ACECs would be open to fluid mineral leasing subject to NSO stipulations. Where ACECs overlap inventoried areas found to possess wilderness characteristics, impacts to the indicators of lands with wilderness characteristics would occur due to the surface disturbance and facility development associated with locatable and fluid mineral development. Closure of ACECs to new nonenergy minerals and saleable minerals operations would protect overlapping lands with wilderness characteristics from this type of surface disturbing development.

Management of ACECs as ROW exclusion areas would result in the protection of overlapping lands with wilderness characteristics. ROW activities and associated development can reduce the size of lands with wilderness characteristics and can impair the apparent naturalness of the area and the experience of solitude, as described under *Nature and Type of Effects*. Precluding these types of activities would help protect 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.

10.19.2 Impacts Common to All Alternatives

Under all alternatives, the BLM would continue to review and approve SRPs on a case-by-case basis within the planning area, and the overall number of large group and commercial SRPs would remain consistent. There would be no direct impacts on recreation through changes to the number and types of SRPs issued annually within the decision area. Any indirect impacts on SRPs would be related to the impacts on the change in the types of recreation activities, experiences, and benefits in the decision area.

Under all alternatives, disturbance caps which restrict the construction of recreation infrastructure would decrease access for recreation experiences that depend on road and trail development and could inhibit management objectives where developments are part of the desired conditions. If future recreation projects would exceed the disturbance cap in a particular area, the disturbance cap would prohibit construction of new recreation facilities such as campground, day-use areas, and trailheads in PHMA and GHMA. However, these disturbance caps would also limit development in some areas, thereby increasing remoteness and naturalness in areas managed for those objectives and enhancing the recreational user experience of primitive backcountry recreation activities and experiences over the long-term (BLM 2014).

10.19.3 Alternative 1

Under Alternative 1, existing restrictions on other resource uses, such as seasonal restrictions on fluid mineral development and disturbance caps, would indirectly affect recreation by reducing resource conflicts

in PHMA, IHMA, or GHMA (**Table 2-3**) as described in **Chapter 2**. Reducing resource conflicts with recreation enhances and preserves the recreational experiences in those areas. These restrictions would reduce the impacts on recreation from the general trend of resource conflict with increasing energy development on BLM-administered lands in those management areas over the long-term. Additionally, other key drivers of change, such as growing public demand for outdoor recreation and technological advances, would also shape future recreational opportunities.

Management of major ROW avoidance areas including those for power lines, pipelines, access roads, and communication sites in PHMA and IHMA and in GHMA in some states (CO, NV/CA, OR), would continue to improve recreation experiences over the long-term as these diminish the naturalness of the physical setting and the opportunities for recreation activities, experiences, and outcomes that require more remote and natural settings. These avoidance areas would not apply to existing roads and facilities.

10.19.4 Alternative 2

Under Alternative 2, there would be more exceptions to restrictions on other resource uses compared with Alternative 1, such as no closed areas for fluid mineral development in Colorado and additional exceptions to the disturbance cap. These exceptions would indirectly increase recreation conflicts with other resources in PHMA, IHMA, and GHMA compared with Alternative 1. While some forms of recreation, such as motorized recreation, may benefit from the expansion of roads associated with energy and mineral development, other forms of recreation, such as primitive recreation and solitude-seeking activities, could experience diminished user experiences due to increased noise, traffic, and industrial infrastructure. Over the long term, these exceptions could contribute to the broader trend of increased energy development on BLM-administered lands, further intensifying the impacts on recreational experiences, particularly for activities dependent on undisturbed landscapes. However, for OHV users, the increase in roads may provide enhanced access to recreation areas.

Management of ROW avoidance areas under Alternative 2 would be similar to Alternative 1, except in Nevada where additional exception criteria would allow for more ROWs to be constructed. This would diminish the naturalness of the physical setting and opportunities for recreation experiences in those areas over time for recreation activities that require more remote and natural settings; however, this exception criteria would only occur in Nevada. Some ROWs, such as for road maintenance and trail development, would enhance other recreational activities by providing better access to recreational activities.

Under Alternative 2, there would be fewer acres of PHMA and GHMA when compared to Alternative 1 (**Table 2-3**). This would restrict fewer acres of land subject to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, the disturbance cap would have the potential to restrict fewer acres than Alternative 1.

10.19.5 Alternative 3

Alternative 3 would impose the greatest restrictions on other resources, including closing fluid mineral leasing in PHMA, and would most greatly reduce the potential for resource conflict with recreation. Reducing resource conflicts with recreation would enhance and preserve recreation which requires specific physical setting characteristics, such as remoteness. This would counter the trend of increased energy development on BLM-administered lands and its impact on recreation resources in PHMA to a greater extent than Alternative 1. These restrictions would also reduce the degradation of physical setting characteristics within the planning area, which would enhance the recreational user experience more than Alternative 1.

By managing more acres of ROW exclusion compared to Alternative 1, Alternative 3 would prohibit such developments over a greater area and would thus maintain the naturalness and remoteness for recreation experiences in these areas (BLM 2014).

Alternative 3 has the greatest acreage of PHMA, which would be subject the greatest acreage to disturbance caps. Therefore, if future recreation would have the potential exceed the disturbance cap in a particular area, the disturbance cap would have the potential to prohibit the construction of new recreation facilities over the largest area when compared with the other alternatives. There would be over double the acres of PHMA when compared to Alternative 1 (**Table 2-3**). Although Alternative 3 offers the greatest protection for primitive recreation and opportunities for solitude, it does so at the expense of motorized recreation users or those unable to participate in primitive activities, compared with Alternative 1.

10.19.6 Alternative 4

Similar to Alternative 1, under Alternative 4, existing restrictions on other resource uses such as fluid mineral leasing, would have an indirect effect on recreation by reducing resource conflicts in PHMA, IHMA, or GHMA. Reducing resource conflicts with recreation enhances and preserves the recreational experiences in those areas.

Under Alternative 4, ROWs would have additional criteria for avoidance of GRSG when compared to Alternative 1, which would limit such developments over a greater area and would thus indirectly affect recreation by maintaining the naturalness and remoteness for recreation experiences in these areas (BLM 2014).

Under Alternative 4, there would be more acres of PHMA and fewer acres of GHMA when compared to Alternative 1 (**Table 2-3**), which would subject fewer acres of land to disturbance caps. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, the disturbance cap would have the potential to restrict fewer acres of land against the construction of new recreation facilities when compared to Alternative 1.

10.19.7 Alternative 5

Similar to Alternative 1, existing restrictions on other resource uses such as fluid mineral leasing, would have an indirect effect on recreation by reducing resource conflicts in PHMA, IHMA, or GHMA. Under Alternative 5, all states would be avoidance for utility scale wind and solar energy development. This would be less restrictive on energy development than Alternative 1, which could indirectly affect recreation by leading to the potential for great resource conflicts with energy development. Increasing resource conflicts with recreation diminishes the recreational experiences in those areas.

Under Alternative 5, ROWs would have less restrictive criteria for avoidance of GRSG when compared to Alternative 1. This would indirectly affect recreation when compared to Alternative 1 by decreasing the naturalness and remoteness for recreation experiences in these areas (BLM 2014).

Under Alternative 5, there would be more acres of PHMA when compared to Alternative 1 (**Table 2-3**). This would restrict more acres of land to disturbance caps when compared to Alternative 1. Therefore, if future recreation projects would exceed the disturbance cap in a particular area, this would have the potential to restrict more acres against the construction of new recreation facilities when compared to Alternative 1.

10.19.8 Alternative 6

Impacts to recreation under Alternative 6 would be similar to impacts under Alternative 5 except in ACECs. Alternative 6 would have greater restrictions on mineral exploration, including fluid minerals, nonenergy minerals, and mineral materials as well as major ROWs, wind and solar. These would indirectly decrease the resource conflicts that also affect recreation resources when compared to Alternative 1.

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 move from open to limited based on changes to HMA designations under each alternative.

Indicators

The indicator of impacts on transportation and travel management are the acres managed as open, and limited to OHV use because existing OHV allocations under the 2015 RMP Amendment are not proposed for change under this RMP Amendment under any alternatives and the 2015 RMP Amendment management direction limits OHV use to designated routes in GHMA and PHMA and does not close any areas to OHV use.

Assumptions

There are no assumptions specific to transportation and travel management.

10.20.2 Impacts Common to All Alternatives

Through Resource Management Plans (RMPs), the BLM designates lands in one of three Off Highway Vehicle (OHV) designation categories: open to cross country vehicle use, limited to existing routes, or closed to OHV use. None of the action alternatives, including the Proposed RMP Amendment, propose changes to the existing 2015 GRSG travel and transportation allocations or management direction. Therefore, under all alternatives, in PHMA and GHMA, OHV travel is limited to existing routes and no cross-country travel is allowed.

The changing HMA allocations occurring across the alternatives could, however, result in changes to areas moving from open to cross country travel to limited to existing routes due to areas moving from non-habitat to either PHMA or GHMA and, conversely, areas could move from limited to open if previously identified habitat (GHMA or PHMA) is no longer identified as habitat and the areas are not otherwise limited or closed under an existing RMP decision. Per the existing 2015 management direction under Alternative 1, PHMA and GHMA that do not have designated routes in a Travel Management Plan will be managed as limited to existing routes until a Travel Management Plan designates routes (unless they are already designated as limited to designated routes or closed to OHV use). As noted, this decision will not change by alternative, but since HMAs change by alternative, areas that were open and not designated as open under Alternatives 1 and 2 could, under each alternative, move to a limited designation because areas once considered non-habitat could be identified as either GHMA or PHMA and in GHMA and in PHMA these areas are managed as limited. **Table 4-4 – Table 4-7** illustrate the acres that have changed in open and limited categories based on changes in the HMA boundaries.

10.20.3 Comparison of Alternatives

The HMA allocations in Colorado, Idaho, Montana, and Wyoming would not change the OHV allocations currently in place under any of the alternatives, and, therefore, there are no anticipated effects to by alternative and thus no effects are expected in those states (**Table 4-4**).

In Nevada/California there is an increase in open areas when compared with the existing condition under Alternative 1 in all alternatives except Alternative 3, where there is a decrease in open areas (refer to Table 4-5 in Appendix 9). The increase in open areas is greatest under Alternative 4. Alternatives 5 and 6 both increase open areas by approximately two million acres (refer to Table 4-5 in Appendix 9). From a travel and transportation perspective, this increase in open areas could allow for more recreation associated with off-highway vehicle use. These increases could also increase resource impacts associated with off-highway vehicle travel.In Oregon, there is decrease in open areas and corresponding increase in limited areas from the existing acres in Alternative 1 in all of the alternatives except Alternative 2 (refer to Table 4-6). The largest decrease in open areas occurs under Alternatives 5 and 6 with approximately 600,000 fewer acres allocated as open. Under Alternatives 3 and 4, there are approximately 465,000 fewer acres allocated as open. From a travel and transportation perspective, these changes could reduce recreation opportunities associated with off-highway vehicle use. These decreases would also reduce resource impacts associated with off-highway vehicle travel.

In Utah, like Oregon, there is a decrease in the amount of OHV areas that are open and a corresponding increase in areas that are limited as a result of changes in HMA allocations. The decrease in open areas is greatest under Alternative 3 followed by Alternative 4 (refer to Table 4-7 in Appendix 9). Under Alternatives 5 and 6 the decrease is approximately 88,000 acres, under Alternative 4 the decrease is approximately 376,000 acres, and under Alternative 3 the decrease is approximately 464,000 acres. From a travel and transportation perspective, these changes could reduce recreation opportunities associated with off-highway vehicle use. These decreases would also reduce resource impacts associated with off-highway vehicle travel.