

Chapter 4. Environmental Consequences

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4.1. Introduction

This chapter presents the direct and indirect impacts on the human and natural environment anticipated to occur from implementing the alternatives presented in **Chapter 2**, Alternatives. The purpose of this chapter is to describe to the decision maker and the public how the environment could change if any of the alternatives in **Chapter 2** were to be implemented. It is meant to aid in the decision of which LUPA, if any, to adopt.

This chapter is organized by topic, similar to **Chapter 3**, Affected Environment. Each topic area includes the following:

- A method of analysis section that identifies indicators and assumptions
- An analysis of impacts for each of the six alternatives that has been broken down by alternative
- A summary comparison of the alternatives

Management actions proposed in **Chapter 2** are planning-level decisions that do not result in direct on-the-ground changes. However, by planning for land use on surface estate and federal mineral estate administered by the BLM and Forest Service over the life of the plan, the analysis focuses on impacts that could eventually result in on-the-ground changes.

Some BLM and Forest Service management actions may affect only certain resources and alternatives. This impact analysis identifies impacts that may benefit, enhance, or improve a resource or resource use as a result of management actions, as well as those impacts that have the potential to impair a resource or resource use. If an activity or action is not addressed in a given section, either no impacts are expected or the impact is expected to be negligible, based on professional judgment.

Resource and resource uses that were not carried forward for detailed review and the reasons they were not carried through are included in **Table 4-1**, Resources and Resource Uses Not Carried Forward for Detailed Analysis. In general, resources and resource uses are not carried forward for further analysis if management actions would not change across the alternatives or if the effect of GRSG management actions would have neutral or positive effects.

Table 4.1. Resources and Resource Uses Not Carried Forward for Detailed Analysis

Resource/Resource Use	Rationale for Not Analyzing Resource or Resource Use in Detail
Fish and Wildlife	Implementation of GRSG conservation measures would generally have a beneficial effect on wildlife species (See Section 4.6 , Special Status Species). Specific effects would depend on location, scale, and timing of projects. These elements of a project are identified during the design and planning of specific projects. Thus, any effect on wildlife will be identified at the project design and implementation phase.
Visual Resources	The compliance with current LUPs' visual resource management will depend upon location and scale of projects. The effects on visual resources will be analyzed during project planning.

Resource/Resource Use	Rationale for Not Analyzing Resource or Resource Use in Detail
Special Designations (Wilderness Areas, Wilderness Study Areas, National Conservation Areas, National Trails, Byways, Wild and Scenic Rivers)	The LUPA will not change the designation of Wilderness, WSAs, NCAs, NHTs, or WSRs. Existing LUP direction would be implemented for the resources when implementing conservation management actions. The BLM and Forest Service would manage Wilderness areas to preserve the characteristics therein. The BLM would manage WSAs to not impair the suitability of such areas for the preservation of wilderness. The BLM would manage the NCA for the purposes for which it was designated. The BLM would manage NHT to safeguard the nature and purposes of the trails and in a manner that protects the values for which the trails were designated. The BLM and Forest Service would manage a river's free-flowing condition, water quality, tentative classification, and any ORVs until Congress designates the river or releases it for other uses. Implementation of GRSG conservation measures would generally have beneficial effects on these special designations.
Lands With Wilderness Characteristics	No decisions related to the management of lands with wilderness characteristics will be made as part of this planning effort. The management of lands with wilderness characteristics is considered outside the scope of this plan amendment process, so existing LUP direction for lands with wilderness characteristics will continue to apply. Effects on lands with wilderness characteristics will be analyzed as part of the implementation of specific conservation projects.
Air Quality	The LUPA decision will not authorize implementation of activities that could impact air quality. Those impacts would be related to timing and location of any ground-disturbing activities. The effects on air quality will be analyzed in the implementation of conservation projects.
Cultural Heritage Resources	The LUPA decision will not authorize ground-disturbing activities. Any potential future effects on cultural resources as a result of the implementation of activities in support of conservation actions for GRSG protection will be subject to NEPA analysis and compliance with Section 106 of the National Historic Preservation Act.

The BLM and Forest Service manage public lands for multiple uses, in accordance with the FLPMA and NFMA. Land use decisions are made to protect the resources, while allowing for different uses of those resources, such as livestock grazing and oil and gas development. These decisions can result in trade-offs, which are disclosed in this chapter's analysis. The projected impacts on land use activities and the associated environmental impacts of land uses are characterized and evaluated for each of the alternatives.

Impact analysis is a cause-and-effect process. The detailed impact analyses and conclusions are based on the following:

- The BLM and Forest Service planning team's knowledge of resources and the project area
- Reviews of existing literature
- Information provided by experts in the BLM and Forest Service, other agencies, cooperating agencies, interest groups, and concerned citizens

The baseline used for the impact analysis is the current condition or situation, as described in **Chapter 3**. Impacts on resources and resource uses are analyzed and discussed in detail, commensurate with resource issues and concerns identified through the LUPA/EIS process. At times, impacts are described using ranges of potential impacts or in qualitative terms.

4.2. Analytical Assumptions

Several overarching assumptions have been 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 resource- or resource use-specific assumptions are provided in the methods of analysis section for that resource or resource use.

- Sufficient funding, enforcement, and personnel would be available for implementing the final decision.
- Implementing actions from any of the LUPA alternatives would be in compliance with all valid existing rights, federal regulations, agency policies, and other requirements.
- Implementation-level actions necessary to execute the LUP-level decisions in this LUPA would be subject to further environmental review, including that under NEPA, as appropriate.
- Direct and indirect impacts of implementing the LUPA would primarily occur on the public lands administered by the BLM and the Forest Service in the planning area.
- Local climate patterns of historic record and related conditions for plant growth may change, with warmer, drier conditions likely to occur over the life of this plan.
- Conditions will remain favorable for large wildfires due to warmer and dryer climatic patterns and fuel conditions.
- In the future, as tools for predicting climate changes in a management area improve and changes in climate affect resources and necessitate changes in how resources are managed, the BLM or Forest Service may be required to reevaluate decisions made as part of this planning process and to adjust management accordingly. Refer to **Section 2.5.3**, Adaptive Management, and Appendix E, Monitoring Framework.
- The BLM and Forest Service would carry out appropriate maintenance for the functional capability of all developments.
- 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.
- 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 and Forest Service-administered lands and federal mineral estate. There are approximately 50.5 million acres of BLM- and Forest Service-administered lands in the decision area.
- Data from GIS have been used in developing acreage calculations and to generate the figures. Calculations depend on the quality and availability of data. Acreages and other numbers are approximate projections for comparison and analytic purposes only. Readers should not infer

that they reflect exact measurements or precise calculations. In the absence of quantitative data, best professional judgment was used. Impacts were sometimes described using ranges of potential impacts or qualitatively, when appropriate.

4.2.1. General Methodology for Analyzing Impacts

Potential impacts are described in terms of type, context, duration, and intensity, which are generally defined below.

Type of impact—Impacts are characterized by using the indicators described at the beginning of each resource impact section. The presentation of impacts for key planning issues is intended to provide the BLM or Forest Service 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 in Nevada and Northeast California; and regional impacts would extend beyond the planning area boundaries.

Duration—This describes the duration of an effect, either short term or long term. Unless otherwise noted, 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 LUPA.

Intensity—This refers to the severity of the impact (40 CFR 1508.27[b]). Rather than categorize severity of impact by qualitative descriptors (e.g., major, moderate, or minor), this analysis discusses impacts using quantitative data wherever possible.

Direct and indirect 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.

For ease of reading, the impacts of the management actions for a particular alternative on a specific resource are generally described in comparison to the status quo or baseline for that resource. However, in order to properly and meaningfully evaluate the impacts under each alternative, the expected impacts should be measured against the impacts projected to occur under Alternative A. This is the baseline for purposes of comparison of the alternatives to one another, as it represents what is anticipated should no plan amendments take place.

The end of **Chapter 4** contains a discussion of Unavoidable Adverse Impacts (**Section 4.20**), Irreversible and Irretrievable Commitment of Resources (**Section 4.21**), and the Relationship Between Local Short-term Uses and Long-term Productivity (**Section 4.22**).

4.2.2. Incomplete or Unavailable Information

The CEQ established implementing regulations for NEPA, requiring that a federal agency identify relevant information that may be incomplete or unavailable for evaluating reasonably foreseeable significant adverse impacts in an EIS (40 CFR 1502.22). If the information is essential to a

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

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

Under FLPMA, the inventory of public land resources is ongoing and continuously updated. However, certain information was unavailable for use in developing the LUPA because inventories either have not been conducted or are not complete. Some of the major types of data that are incomplete or unavailable include the following:

- GIS data used for disturbance calculations on private lands
- Site-specific surveys of cultural and paleontological resources

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

4.3. Greater Sage-Grouse and Greater Sage-Grouse Habitat

4.3.1. Methods and Assumptions

Indicators

Indicators of impacts on GRSG are as follows:

- Direct habitat loss
- Habitat fragmentation
- Disruption to species life history requirements
- Population loss
- Habitat degradation
- Habitat restoration/improvement

Effects listed above may be characterized for each resource and alternative as appropriate, and, where available, quantified by the indicators described below:

- PPMAs (PPH)/PGMAs (PGH) – Designations include habitats considered vital to the persistence of GRSG populations at all scales. Acres impacted or improved by each

resource is a general metric for direct habitat loss, habitat degradation, and habitat restoration/improvement. The metric provides a basis for a qualitative discussion of habitat fragmentation and species life history requirements.

- Nesting habitat – Metric is derived from a buffering of lek locations (Doherty et al. 2011) as a proxy for spatially describing nesting habitat in acres of PPH and PGH, and provides a specific quantitative measure of potential improvement/disruption of species life history requirements for nesting with implications for populations. Habitats within the buffers are known to include areas supporting other seasonal life history requirements as well. Habitats outside lek buffers may also contain nesting habitat but primarily support other seasonal life history requirements such as brood-rearing, wintering, and transitional.

Populations – Metric is correlated to nesting habitat and is derived by assigning to individual leks their contribution to GRSG populations at the population/subpopulation scale (see **Section 3.2**, Greater Sage-Grouse and Greater Sage-Grouse Habitat) and at the sub-region scale. This metric provides for inferences toward population effects from each resource allocation expressed as a percentage of population at the two scales. Where modeled nesting habitat is overlapped by a land allocation, the allocation is considered to be affecting the GRSG population assigned to that associated lek. Each lek supports a percentage of the GRSG population at the sub-population and sub-region scale. **Table 4-2**, Resource Programs Impacting GRSG by Threat in the Sub-region, relates individual resource programs to threats to the species in order of priority within the sub-region. Impacts from each resource are assessed using the indicators described above.

Table 4.2. Resource Programs Impacting GRSG by Threat in the Sub-region

Threat/Issue	Resource Program
Wildfire	Fire, fuels, vegetation
Invasive species	Fire, fuels, vegetation
Conifer encroachment	Fire, fuels, vegetation
Infrastructure	ROW/SUA avoidance/exclusion areas, ACECs, wilderness, Wilderness Study Areas
Climate change	Climate change, fire, fuels, vegetation
Livestock grazing	Areas open/closed to livestock grazing
Mining	Areas open/closed to locatable and salable minerals
Energy development	Areas open/closed to fluid mineral exploration, leasing, development
Human uses	ROW/SUA avoidance/exclusion areas, ACECs, wilderness, Wilderness Study Areas, areas open, limited, closed to motorized travel

Assumptions

The analysis includes the following assumptions:

- For Nevada, PPMAs and PGMAs are derived from NDOW habitat category mapping (NDOW 2012a) and represent habitat adequate to maintain GRSG populations. For the Northeastern California/Northwestern Nevada population, California BLM utilized a mapping methodology based in the Doherty modeling (Doherty et al. 2011), including the 100 percent breeding bird density core regions, or all known active leks with appropriate buffering (6.4 kilometers for 25 percent and 50 percent kernels, 8.5 kilometers for 75 percent and 100 percent kernels). Areas were modified by local knowledge of seasonal range use, known connectivity, and vegetative and natural barriers. In California, extensive radio telemetry information was available, providing a direct footprint of GRSG use areas.

- This analysis uses PPH and PGH categories for Alternative A only to facilitate comparison across the other alternatives. There are currently no public lands designated by the BLM or Forest Service as GRSG PPH or PGH within the sub-regional planning area and Alternative A would neither result in the designation of PPH or PGH nor assign additional management actions to PPH or PGH areas. As used for comparison, PPH is based on NDOW Category 1 and 2 habitats, while PGH is based on NDOW Category 3 habitat. Nesting habitat is defined as the 4-mile (6.4-kilometer) buffer around 25 percent and 50 percent bird density kernels and the 5.2-mile (8.5-kilometer) buffer around 75 percent and 100 percent bird density kernels (Doherty et al. 2011).
- Population and subpopulation boundaries (Connelly et al. 2004) are modified to include whole population management unit (PMU) (NDOW 2002) boundaries (see **Section 3.2**, Greater Sage-Grouse and Greater Sage-Grouse Habitat).
- Habitat conditions and trends for each GRSG population area were determined using the VDDT by modeling vegetation dynamics such as wildfire, succession, insects and disease, habitat restoration projects, prescribed fire, overgrazing, conifer encroachment and treatment, mechanical sagebrush treatment, and fuels reduction projects. VDDT modeling was completed for seven of the nine population/subpopulations in Nevada and California. Northern Interior and Quinn Canyon Range were not modeled due to lack of mapped habitat. As additional data becomes available, habitat conditions and trends will be updated.

Impacts on GRSG accrue over varying distances from origin depending on the type of development:

- Tall structures such as power lines, wind turbines, communication towers, agricultural, and urban development based on an avian predator foraging distance of 4.3 miles (6.9 kilometers; Boarman and Heinrich 1999; Leu et al. 2008)
- Energy extraction such as oil and gas, geothermal, and plan of operation mining at 11.8 miles (19 kilometers) based on direct impacts of field development, including associated infrastructure, noise, lighting, and traffic (Johnson et al. 2011; Taylor et al. 2012)
- Interstate highways at 4.7 miles (7.5 kilometers) and paved roads and primary and secondary routes at 1.9 miles (3 kilometers) based on indirect effects measured through road density studies (Connelly et al. 2004; Holloran 2005; Lyon 2000)
- Site-specific disturbances such as small-scale mining and mineral material sites at 1.6 miles (2.5 kilometers) based on indirect influence distance from estimated spread of exotic plants (Bradley and Mustard 2006)
- Short-term impacts would accrue over a timeframe of up to ten years. Long-term impacts would accrue over timeframes exceeding ten years.
- Because GRSG are highly sensitive to habitat fragmentation, development, or changes in habitat conditions and require large, intact habitat patches to complete their annual life history, alternatives proposing to protect the most PPMAs and PGMAAs from disturbance are considered of greatest beneficial impact. These impacts can be described both qualitatively and quantitatively.
- Seasonal ranges of migratory and non-migratory GRSG are included within PPMAs and PGMAAs but are not mapped to provide direct impacts assessment at the sub-regional scale.

PPMAs and PGMAs encompass adequate habitat for providing connectivity within populations and subpopulations. Connectivity will be considered by incorporating PMU-scale information in the design and implementation of restoration projects.

4.3.2. Nature and Type of Effects

Riparian Areas and Wetlands

See Livestock Grazing Management, below.

Water Resources Management

See Livestock Grazing Management, below.

Vegetation and Habitat Restoration

Current treatments and active vegetation management typically focus on vegetation composition and structure for fuels management, habitat management, and productivity manipulation for protecting and improving the habitat and forage conditions for ungulates and other grazers (Knick et al. 2011). The distribution of these treatments can affect the distribution of GRSG and sagebrush habitats by affecting the distribution of suitable cover and forage (Manier et al. 2013, p. 169).

GRSG require high-quality habitat conditions, including a diversity of herbaceous species, vegetative and reproductive health of native grasses, and an abundance of sagebrush (Manier et al. 2013, p. 169). Residual vegetation cover, especially grass and litter, has often been noted as essential for GRSG for concealment during nesting and brood-rearing (Sveum et al. 1998; Kirol et al. 2012). Passive restoration efforts such as adjustments in management practices such as grazing systems and seasonal restriction or closures in seasonal-use areas have a reasonable chance to improve degraded or altered habitats (Manier et al. 2013, p. 170; Connelly et al. 2004).

Some areas within the Nevada and Northeastern California Sub-Region are experiencing severe habitat degradation such that the establishment of “undesirable” species has displaced native species, making passive management approaches unsuitable and requiring direct manipulation (Connelly et al. 2004). In parts of the sub-region, invasive species such as cheatgrass or native species such as juniper and pinyon pine have replaced desirable dominant species. These areas require active removal and seeding of native species for successful restoration. Active treatments within the sub-region include manual and mechanical juniper and pinyon pine removal and planting of native seed and seedlings.

Invasive plants are thought to alter plant community structure and composition, productivity, nutrient cycling, and hydrology, and may competitively exclude native plant populations. Cheatgrass competes with native grasses and forbs that are important components of GRSG habitat. Cheatgrass abundance is negatively correlated with habitat selection by GRSG (Kirol et al. 2012), indicating that changes in composition and structure associated with cheatgrass specifically degrade GRSG habitat. Invasion by medusahead (*Taeniatherum caput-medusae*) may be even worse than cheatgrass, as it also reduces perennial productivity, degrades wildlife habitat, supports high-frequency wild fire intervals, and requires intensive treatment for restoration (Davies 2010). Expansion of conifer woodlands also threatens GRSG populations because woodlands do not provide suitable habitat and because trees displace shrubs, grasses, and forbs that are required by GRSG. Juniper expansion is also associated with increased bare

ground and the potential for erosion, as well as an increase in perch sites for raptors. Juniper encroachment may also represent expansion of raptor predation threats. Invasive species cause direct degradation of sagebrush habitats, resulting in effects on local GRSG populations by affecting forage, cover quality and composition, and increased wildfire frequency and intensity, with the potential to cause complete avoidance (Manier et al. 2013, p. 135).

Livestock Grazing Management

Livestock grazing is the most widespread land use across the sagebrush biome (Connelly et al. 2004, pp. 7-29). Livestock grazing can affect soils, vegetation, water, and nutrient availability by consuming or altering vegetation, redistributing nutrients and plant seeds, trampling soils and vegetation, and disrupting microbial composition (Connelly et al. 2004). Livestock may also trample nests and disturb GRSG behavior (NTT 2011, p. 14). Livestock grazing is a “diffuse” form of biotic disturbance that exerts repeated pressure over many years on a system; unlike point-sources of disturbance (e.g., fires), effects of grazing are not likely to be detected as disruptions, but as differences in the processes and functioning of the sagebrush system. Grazing effects are not distributed evenly because historic practices, management, and animal behavior all lead to differential use of the range (Manier et al. 2013, pp. 157-168).

At unsustainable levels of grazing, impacts can lead to loss of vegetative cover, reduced water infiltration rates, decreased plant litter, increased bare ground, reduced nutrient cycling, decreased water quality, increased soil erosion, and reduced overall habitat quality for wildlife, including GRSG (Manier et al. 2013, pp. 157-159). Properly managed grazing, however, may protect GRSG by reducing fuel loads (NTT 2011, p. 14).

Structural range improvements such as fences represent potential movement barriers (especially woven-wire fences), predator perches, or travel corridors, and are a potential cause of direct mortality to GRSG (Manier et al. 2013, p. 89). Grazing restrictions that protect sagebrush ecosystem health would enhance habitat for GRSG populations.

Fire and Fuels Management

Fire is the primary threat to GRSG populations and habitat within the western half of their distribution. In the Great Basin, fire has been increasing in size and frequency (Baker 2011). Fire is particularly problematic in sagebrush systems because it kills sagebrush plants and, in some cases, re-burns before sagebrush has a chance to re-establish.

Fire is a primary threat to GRSG populations and habitat where increasing exotic annual grasses, primarily cheatgrass, are resulting in sagebrush loss and degradation (USFWS 2010a, p. 13,932). Cheatgrass can more easily invade and create its own feedback loop in areas that are: 1) dry with understory vegetation cover that is not substantial, or 2) experiencing surface-disturbing activities (e.g., road construction). It can facilitate short fire return intervals by outcompeting native herbaceous vegetation with early germination, early moisture and nutrient uptake, prolific seed production, and early senescence (Hulbert 1955; Mack and Pyke 1983; Pellant 1996). Furthermore, by providing a dry, fine fuel source during the peak of fire season, cheatgrass increases the likelihood of fire and thus increases the likelihood of further cheatgrass spread (Pellant 1990). Without fire, cheatgrass dominance can exclude sagebrush seedlings from establishing. With fire, areas can be converted to annual grasslands. Without shrubs and a diversity of grasses and forbs, such annual grasslands will not support GRSG, and populations could be displaced.

Fire risk and the likelihood of the cheatgrass-fire cycle in GRSG habitat is highest in arid, low-elevation areas with Wyoming big sagebrush (*Artemisia tridentata* ssp. *tridentata*), particularly in areas where there is ground disturbance or bare ground (e.g., recently burned areas). Ground disturbance such as roads facilitates the establishment and spread of cheatgrass and other invasive weeds (Gelbard and Belnap 2003). While fires do occur within higher elevation mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) habitats, they are typically smaller and lower intensity fires. This is primarily due to higher precipitation levels, resulting in higher fuel moisture levels, more robust understory vegetation, and more rapid growth rates.

Another factor affecting fire in some sagebrush sites is the encroachment of pinyon and juniper trees from higher elevations down slope into sagebrush habitats (Baker 2011; Balch et al. 2012). Under suitable conditions, wildfires that start in pinyon and juniper stands can move into Wyoming big sagebrush stands. In the absence of cheatgrass, Wyoming sagebrush sites can take 150 years to recover. Where cheatgrass is present, fire can open the site to invasion of annual grasses as described above.

In the Nevada and Northeastern California Sub-region, five of seven modeled populations/subpopulations and both unmodeled populations experience declining habitat trends directly attributable to fire and cheatgrass invasion. Depending on the amount of habitat available to the birds, a single fire can influence a local population's distribution, migratory patterns, and overall habitat availability (Fischer et al. 1997, p. 89). In degraded GRSG habitats where cheatgrass is dominant under the sagebrush canopy, the habitat may be adequate winter habitat or provide adequate cover for nesting. However, these areas may lack the understory forb diversity and insect abundance necessary for brood-rearing and could result in lower chick survival. As GRSG habitats become smaller and less connected to adjacent populations, they become increasingly susceptible to stochastic events and local extirpation (Knick and Hanser 2011; Wisdom et al. 2011). In addition, genetically isolated populations could suffer from a decrease in fitness known as inbreeding depression.

The cheatgrass fire cycle causes GRSG habitat loss and degradation on an annual basis. Currently, due to the extent of the threat, there are no management actions that can effectively alter this trend, and fires are estimated to reduce GRSG habitat within the Great Basin by 58 percent in the next 30 years (Miller et al. 2011). While research and management efforts are focused on developing means of controlling cheatgrass on a large scale, the only current management actions, under the fire program, to minimize the likelihood of fire ignition or the extent of fire in GRSG habitat is through fuels treatments (e.g., construction of firebreaks or greenstrips), pre-suppression planning, and effective fire suppression geared toward protecting GRSG habitat. Facilitating the spread of cheatgrass and the likelihood of ignition through BLM and Forest Service-authorized programs is further discussed under **Sections 4.12**, Lands and Realty; **4.14**, Minerals; and **4.10**, Recreation.

Wild Horse and Burro Management

While not as widespread as livestock grazing, wild horse and burro management is still a major land use across the sagebrush biome. HMAs and WHBTs overlap modeled populations by 0 to 100 percent depending on sub-population in the region. Impacts from horses, however, are somewhat different than impacts from cattle (USFWS 2013a, p. 46). According to the COT Report (USFWS 2013a, p. 46):

On a per capita body mass, horses consume more forage than cattle or sheep and remove more of the plant which limits or delays vegetative recovery (Menard et al. 2002), and horses can range further between water sources than cattle, thereby making them more difficult to manage.

Wild horse and burro grazing results in a reduction of shrub cover and more fragmented shrub canopies, which can negatively affect GRSG habitat (Beever and Aldridge 2011). Additionally, sites grazed by free-roaming wild horses and burros have a greater abundance of annual invasive grasses, reduced native plant diversity and reduced grass density (Beever and Aldridge 2011).

Effects of wild horses and burros on habitats may also be more pronounced during periods of drought or vegetation stress (NTT 2011, p. 18).

Wild horses and burros require that water be available year-round in herd management areas and wild horse territories (The Wild and Free-Roaming Horses and Burros Act of 1971). This often leads to riparian areas receiving yearlong use by wild horses or riparian areas being modified with additional fencing and troughs in order to accommodate yearlong horse use. The range improvements would result in increased potential for raptor perch sites and less water available on the ground, and would possibly have negative effects on GRSG riparian habitat depending on how each facility is constructed and making GRSG more vulnerable to predation. According to Berger (1986), one measure of habitat quality for wild horses is the presence of meadows. Horse bands that spent more time foraging in meadows had higher reproductive success, and meadows received the highest use in proportion to their availability. At levels higher than established AMLs, impacts can lead to loss of vegetative cover, decreased water quantity and quality, increased soil erosion, and reduced overall habitat quality for wildlife, including GRSG.

Locatable, Leasable, and Salable Minerals Management

Minerals development within the sub-region consists of locatable mineral resources at various scales that require a Notice of Intent when disturbance is 5 acres or less, or Plans of Operation when the total unreclaimed disturbance will exceed 5 acres, or if the proposed operations meet one or more of the criteria requiring a Notice of Intent or a Plan of Operations (43 CFR 3809.21 and 36 CFR 228.4). Locatable minerals exploration and mining is primarily for gold, silver, and copper. Leasable minerals in Nevada include commodities such as potassium, phosphate, and sodium. Fluid minerals include oil and gas and geothermal development. Oil and gas development is in limited production, occurring only in the far southeastern sub-region. Oil and gas leasing occurs over a larger footprint in eastern Nevada. Geothermal potential within the sub-region is widespread but localized. Impacts on GRSG associated with geothermal development are similar to fossil fuel-fired power plants. This is because the resources are exploited in a highly centralized fashion, including the footprint of the power plant itself, access roads, and transmission lines. Development of locatable and leasable mineral resources typically requires significant infrastructure and human activity for construction, operation, and maintenance.

Mineral extraction of all types, including locatable, leasable, and salable extraction, in GRSG habitat results in habitat loss caused by construction of infrastructure, the footprint of the surface or subsurface operation, and other associated facilities. Sagebrush communities that are lost or modified in locations where reclamation is not compromised by the presence or introduction of invasive grasses may not regain sagebrush cover suitable for GRSG use for 20 to 30 years or longer following interim or final reclamation. Population re-establishment may take upwards of 30 years (Braun 1998). Where compromised, reclamation may only be minimally effective. Necessary infrastructure causes additional direct and indirect impacts on GRSG from location, construction, and use of ancillary facilities, staging areas, roads, railroad tracks, and structures such as buildings and power lines.

The industrial activity associated with energy and mineral development produces noise and human activity that disrupt the habitat and life-cycle of GRSG. All studies which assess impacts

of energy development on GRSG have found negative effects on populations and habitats (Naugle et al. 2011). Noise from industrial activity may disrupt GRSG communication, which is at low-frequency and potentially masked by low-frequency noise from equipment and vehicles, resulting in reduced female attendance and yearling recruitment as seen in sharp-tailed grouse (*Pedioecetes phasianellus*; Amstrup and Phillips 1977). The authors found that the low-frequency mining noise in the study area was continuous across days and seasons and did not diminish as it traveled from its source. The mechanism of how low-frequency noise affected the birds in the study was not known, but it is known that GRSG depend on acoustical signals to attract females to leks (Gibson and Bradbury 1985; Gratson 1993). Noise associated with oil and gas development may have played a factor in habitat selection and a decrease in lek attendance by GRSG (Holloran 2005). Recent studies in oil and gas areas indicate that continuous noise levels, and even intermittent road traffic, reduce lek attendance when levels approach 10 decibels over ambient conditions (Patricelli in review).

Infrastructure for mining is similar to that required for oil and gas but is more localized in extent. As revealed by studies on oil and gas development, the interaction and intensity of effects of habitat loss could cumulatively or individually lead to habitat fragmentation in the long term (Connelly et al. 2004; Holloran 2005) with negative impacts of fragmentation as a result of development and associated infrastructure on lek persistence, lek attendance, winter habitat use, recruitment, yearling annual survival rate, and female nest site choice (Holloran 2005; Aldridge and Boyce 2007; Walker et al. 2007; Doherty et al. 2008).

Land Uses and Realty Management

Transmission lines and major power lines are widespread throughout the range of GRSG. GRSG generally respond negatively to increased human infrastructure in sagebrush habitats, including roads, power lines, and communication towers (Manier et al. 2013, pp. 71-74). Although transmission and power line construction does not generally result in substantial direct habitat loss, it would temporarily disturb individual GRSG and habitat along the ROW. Roads associated with energy transmission facilities can contribute to habitat fragmentation by reducing the extent of contiguous blocks of habitat and reduce the amount and quality of GRSG habitat. Following construction, GRSG avoidance of vertical structures, potentially due to avian predators perching on the structures, may result in habitat exclusion via behavioral response. One study reported that the frequency of raptor/GRSG interactions during the breeding season increased 65 percent and golden eagle interactions alone increased 47 percent in an area in pre- and post-transmission line comparisons (Manier et al. 2013, pp. 81-82). Additionally, the tendency of GRSG to fly relatively low, and in low light or when harried, may put them at high risk of collision with power lines (Manier et al. 2013, pp. 81-82).

ROW/SUA exclusion areas would prohibit all development of ROWs, with some exceptions provided, while ROW/SUA avoidance areas would consider on a case-by case basis whether a ROW or Forest Service SUA would be allowed. This flexibility may be advantageous where federal and private land-ownership areas are mixed and exclusion areas may result in more widespread development on private lands if government managed lands could not be used. Land tenure adjustments or withdrawals made in GRSG habitat could reduce the habitat available to sustain GRSG populations, unless provisions were made to ensure that GRSG conservation remained a priority under the new land management regime. Land exchanges designed to decrease fragmentation of GRSG habitat would help GRSG populations (NTT 2011, p. 12).

Renewable Energy

The Southern Great Basin and Northern Great Basin WAFWA GRSG Management Zones totaled over 850 square miles (2,200 square kilometers) leased for wind energy; second only behind the heavily developed Wyoming Basin (Knick et al. 2011). Geothermal production provides 17 percent of the renewable electricity generation in the United States, most of which is in California outside of sagebrush habitat (Knick et al. 2011). Geothermal production within the current range of GRSG is primarily in the Great Basin (Knick et al. 2011). Much speculation occurs regarding the potential for renewable energy facilities to affect GRSG because renewable energy in general is too recent to ascertain immediate or lag effects caused by the industry.

Because grouse species have evolved in habitats with little vertical structure, it is conjectured that tall vertical structures such as wind turbines will displace grouse far from their normally used habitat (Johnson and Stephens 2011). It is unknown if local populations affected by anthropogenic energy disturbances would become acclimated and return to use the area and maintain viable population numbers.

Because large-scale development of renewable energy resources is recent compared with oil and gas, many of the long-term impacts of renewable energy are still being studied and results have not been published in scientific literature. However, potential infrastructure development impacts on GRSG can be anticipated from studies of oil and gas development on the species (Becker et al. 2009).

Impacts from energy development accrue both locally and at the landscape scale. Accumulated evidence across landscape-scale studies show that GRSG populations typically decline following oil and gas development (Holloran 2005; Walker et al. 2007; Doherty et al. 2008). Oil and gas infrastructure and associated human activity have been shown to adversely affect GRSG populations collectively and in some instances, impacts have been directly attributed to certain anthropogenic features (e.g., roads, power lines, noise, associated infrastructure; Walker et al. 2007; Doherty et al. 2008; Lyon and Anderson 2003; Holloran 2005; Kaiser 2006; Aldridge and Boyce 2007).

Renewable energy development and its similar infrastructure to oil and gas (e.g., power lines, roads, and construction activities) may negatively affect GRSG populations via several different mechanisms. Mechanisms responsible for cumulative impacts that lead to population declines depend on the magnitude, frequency, and duration of human disturbance. GRSG may abandon leks if repeatedly disturbed by raptors perching on power lines or other tall vertical structures near leks (Ellis 1984), by vehicular traffic on roads (Lyon and Anderson 2003) or by noise and human activity associated with energy development (Braun et al. 2002; Holloran 2005; Kaiser 2006). Collisions with power lines, vehicles, property fencing, and increased predation by raptors may increase mortality of birds at leks (Connelly et al. 2000a; Lammers and Collopy 2007). Roads and power lines may also indirectly affect lek persistence by altering productivity of local populations or survival at other times of the year. GRSG mortality associated with power lines and roads occurs year round (Aldridge and Boyce 2007) and artificial ponds created by development (Zou et al. 2006) that support breeding mosquitoes known to vector West Nile virus (Walker et al. 2007) elevate risk of mortality from disease in late summer (Walker and Naugle 2011). GRSG may also avoid otherwise suitable habitat as development increases (Lyon and Anderson 2003; Holloran 2005; Kaiser 2006; Doherty et al. 2008).

Avoidance of development areas should not be considered a simple shift in habitat use, but rather a reduction in the distribution of GRSG (Walker et al. 2007) because avoidance is likely to result in true population declines when density dependence, competition, or displacement of birds into

poorer-quality adjacent habitat lowers survival or reproduction (Holloran and Anderson 2005; Aldridge and Boyce 2007; Holloran et al. 2010). GRSG exhibit extremely high site fidelity which strongly suggests that unfamiliarity with new habitats may also reduce survival (Baxter et al. 2008), as evidenced in other grouse species (Yoder et al. 2004). Grouse species avoid other anthropogenic features such as roads, power lines, oil and gas wells, and buildings (Lyon and Anderson 2003; Pruett et al. 2009) and augmentation of dwindling GRSG populations, via introduction of translocated birds or supplementing existing populations is often unsuccessful (Naugle et al. 2011; Baxter et al. 2008).

Comprehensive Travel and Transportation Management

The CTTM program is principally focused on road networks within the GRSG range. Though roads can range from state or interstate highways to gravel and two-track roads, BLM and Forest Service travel management primarily involves the level of access allowed to the public within travel management zones identified as closed, limited (to existing or designated roads and trails), or open. Use of roads is predominately associated with recreational pursuits on public lands. Areas currently open to cross-country motorized use would be expected to have greater impacts than those areas where travel is limited to existing roads and trails or closed to motorized use.

Road densities have been directly correlated with GRSG persistence. Within the GRSG range, 95 percent of the mapped sagebrush habitats are within 1.6 miles (2.5 kilometers) of a mapped road; density of secondary roads exceeds 3.1 miles/247 acres (5 kilometers/square kilometers) in some regions (Knick et al. 2011). Roads have multiple impacts on wildlife in terrestrial ecosystems, including, increased mortality from collision with vehicles, changes in behavior, loss, fragmentation, and alteration of habitat, spread of exotic species, and increased human access, resulting in facilitation of additional alteration and use of habitats by humans (Formann and Alexander 1998; Jackson 2000; Trombulak and Frissel 2000). The effect of roads can be expressed directly through changes in habitat and GRSG populations and indirectly through avoidance behavior because of noise created by vehicle traffic (Lyon and Anderson 2003; USFWS 2010a; See Assumptions and Indicators regarding interstates and primary routes).

While the direct habitat loss from roads is not known to be substantial, roads fragment the habitat by impeding use of migration corridors or seasonal habitats; facilitate habitat degradation in the remaining habitats by creating a corridor along which invasive plants can spread; allow for increased human noise disturbance which can result in GRSG habitat use avoidance (i.e., functional habitat loss); and increase mammalian and avian predator abundance (Formann and Alexander 1998, pp. 207-231). Connelly and others (2004) suggest road traffic within 4.7 miles of leks negatively influences male lek attendance. Similarly, lek count trends are lower near interstate, federal, or state highways compared with secondary roads (Johnson et al. 2011), and Connelly and others (2004) reported no leks within 1.25 miles of an interstate and, in general, leks closer to the interstate had higher rates of decline than leks further away from the interstate (See the discussion of Interstate 80 in Nevada in **Section 3.2**, Greater Sage-Grouse and Greater Sage-Grouse Habitat). In Montana and southern Canada, as the length of roads within 2 miles of a lek increased, the likelihood of lek persistence decreased (Manier et al. 2013).

Motorized activities are expected to have a larger footprint on the landscape than non-motorized users. Cross-country motorized travel would result in increased potential for soil compaction, loss of perennial grasses and forbs, and reduced canopy cover of sagebrush (Payne et al. 1983). Long-term losses in sagebrush canopy would likely be the result of repeated, high frequency, long duration use by cross-country OHV use. Impacts on vegetation communities would likely be

greater during the spring and winter months when soil conditions are wet and more susceptible to compaction and rutting. In addition, the chances of wildfire are increased during the summer months when fire dangers are high and recreation is also at its highest. Noise and increased human presence associated with construction, use, and maintenance of roads may change GRSG behavior based on the proximity, magnitude, intensity, and duration.

Other Resources

Implementing management for the following resources would have negligible or no impact on GRSG and are therefore not discussed in detail: recreation use excluding CTTM, and ACECs.

4.3.3. Impacts Common to All Alternatives

Impacts from Climate Change

The impacts of climate change are common to all alternatives. Maximum seasonal temperatures and altered rainfall patterns exacerbate the fire cycle such that large-scale fires are not only driven by the annual cheatgrass flush of fine fuels but are also fueled by historically low moisture ratings in larger fuels in the shrub community. As temperatures and levels of rainfall change, the climate envelopes supporting the sagebrush ecosystem will shift. The adjacent Mojave ecosystem expands northward. Low elevation sagebrush habitats convert to desert scrub. Forest/sage ecotones shift toward sagebrush. Some of these shifts, particularly in the southern half of the range, will likely occur at rates that challenge the ability of GRSG to adapt, requiring an adaptive management strategy regardless of alternative features in land use planning.

Impacts from Renewable Energy Management

The magnitude of impacts is different for all alternatives as the acreages of lands managed for ROWs, SUAs, and zoning designations (e.g., Solar PEIS and Wind Energy EIS) vary across the alternatives (see **Table 2-3**, Comparative Allocation Summary of Alternatives, in **Chapter 2**). However, industrial solar construction and infrastructure are expected to have similar effects on GRSG and, therefore, effects caused by duration and frequencies are expected to be similar across all alternatives. Under all of the alternatives, no acres of GRSG habitat within the planning area would be managed for Solar Energy Zones.

4.3.4. Alternative A

Impacts from Vegetation and Soils Management

Under Alternative A, current management implements the Integrated Vegetation Management Handbook policies (BLM 2008j), Land Health Standards, Vegetation Treatments Using Herbicides Programmatic EIS (BLM 2007a) and the Sage Steppe Ecosystem Restoration Strategy Final EIS (BLM 2008f), as well as other policies and plans. The Integrated Vegetation Management Handbook requires an interdisciplinary and collaborative process to plan and implement vegetation treatments that improve biological diversity and ecosystem function while promoting and maintaining native plant communities that are resilient to disturbance and invasive species. Land-health standards are ecologically based goal statements which include watershed function, ecological processes, water quality, and habitat quality for threatened and endangered and special status species (43 CFR 4180.1). Land Health Standards Assessments are used to establish program priorities, determine the status of current conditions and set the stage for

evaluations that are used to determine achievement or non-achievement of land-health standards. While the Sage Steppe Ecosystem Restoration Final EIS, which is specific to northeastern California, focuses on the restoration of sage steppe ecosystems and associated vegetation communities that have become dominated by western juniper.

Implementation of the above policies and plans would improve vegetation management by decreasing invasive species, provide for native vegetation establishment in sagebrush habitat, reduce the risk of wildfire, restore fire-adapted ecosystems and repair lands damaged by fire. These policies also recognize the need to improve the diversity, resiliency and productivity of native vegetation health and persistence (BLM 2008f).

Mechanical juniper and pinyon pine treatments would result in short-term disturbances of soils and sagebrush due to heavy equipment, skid trails and temporary roads. Mechanical and manual treatments would also increase noise, vehicular traffic and human presence. However, once the site potential is restored there would be a long-term increase in forage, cover quality and composition, reduction in predator perches, decrease in fire spread and intensity and a potential increase in water availability.

Annual grass expansion in low-elevation sagebrush habitat is outpacing existing treatment rates in five of seven modeled population/subpopulations and the remaining two un-modeled populations. Current treatment rates are maintaining or reducing annual grass in the Northeastern Nevada and Central Nevada subpopulations.

Conifer expansion is predominant in mountain sagebrush but also occurs within Wyoming and low sagebrush. Seral classes which include substantial conifer dominate in three of seven modeled subpopulations including Southeastern Nevada where conifer is a significant component on 42 percent of mountain sagebrush habitat and 21 percent of Wyoming sagebrush habitat. Under current treatment rates, trends here are stable to slightly improving. In Northwestern Nevada/Northeastern California, conifer is a significant component on 21 percent of mountain sagebrush habitat. Trends at current treatment rates are slightly improving. In the Central Nevada subpopulation, conifer is a significant component on 18 percent and 6 percent of mountain and Wyoming sagebrush habitats with trends continuing to decline under current treatment rates. The Quinn Canyon Range population is an un-modeled population where conifer impacts are high.

Impacts from Livestock Grazing Management

Under Alternative A, 49,155,000 acres in the planning area (17,589,700 acres of existing PPH and PGH; approximately 142,900 acres within existing PPH and PGH are unallotted to grazing) are open for livestock grazing affecting 94 percent of the modeled populations within the sub-region. Livestock grazing would continue to be managed through existing grazing plans, with methods and guidelines from the existing plans followed to maintain ecological conditions according to Standards for Rangeland Health, which include maintaining healthy, productive and diverse populations of native plants and animals. Nevada LUPs do not contain specific language in regards to GRSG conservation and livestock management although many offices are covered under various conservation strategies for GRSG. Recent California LUPs have specific language regarding the management of livestock and its relation to locally produced GRSG conservation strategies. National and in some cases, local drought policies are in place and would be followed to minimize impacts on rangelands under drought conditions. Continuation of these policies would not specifically protect GRSG habitat, though could provide indirect benefits through preservation of existing sagebrush habitat. Direct impacts on GRSG would be reduced in some areas due to GRSG specific management found in some conservation strategies.

According to National BLM policy, riparian habitats would be managed to achieve PFC. On Forest Service-administered lands, riparian areas are managed through a combination of utilization standards and design features discussed/documentated each year in the AOI. Functional condition of riparian areas and wetlands are considered in the development of riparian utilization standards. In some cases this management would require livestock removal or restrictions in riparian areas to reduce impacts caused by livestock, such as trampling and overuse of riparian areas. Managing for PFC helps to improve riparian vegetation health through increased production and diversity of vegetation and helps to improve water retention on those sites. As a result, brood-rearing habitats for GRSG would be improved or preserved where they are applied.

Range improvements would be designed to meet both wildlife and range objectives, and would include building or modifying fences to permit passage of wildlife and reduce the chance of bird strikes, use of off-site water facilities, and in some cases modification or removal or improvements not meeting resource needs. Modifications may involve moving troughs, adding or changing wildlife escape ramps, or ensuring water is available on the ground for a various different wildlife species. Although not directly created to protect GRSG, these approaches would protect and enhance GRSG habitat by reducing the likelihood of surface disturbance in sensitive areas and ensuring brood-rearing habitat is available to GRSG.

Impacts from Fire and Fuels Management

Within the planning area, all LUPs address fire suppression and fuels management; however, most plans do not include direction for these activities that is specifically focused on GRSG and its habitat. The more recent LUPs contain specific objectives and management action for suppression and management of fires within sagebrush vegetation communities and GRSG habitat in accordance with local conservation strategies. Each LUP supports the development and adherence to a more detailed fire management plan that outlines priorities and levels of suppression for particular vegetation classes, or resource protection. Most plans support objectives of re-introducing fire into fire-dependent ecosystems and utilize the Fire Regime Condition Class (FRCC) framework to aid in prioritizing response to wildfires and determining where fire can be used to meet land management plan objectives. Plans place priority for suppression on the protection of life and property followed by important resource values.

In general, fire suppression activities, fuels management, post-fire emergency stabilization and fire restoration efforts are not specifically focused on GRSG, but GRSG may benefit from reduced fire size, post-fire site stabilization, or rehabilitation of diverse native vegetation communities. Some LUPs promote the use of native seed for stabilization and restoration, which may help increase native plant diversity and thereby benefit GRSG, but this guidance is not consistently applied across the decision area. More direction for the BLM has been provided in BLM Instruction Memorandum 2013-128, which provides habitat maps, guidelines and BMPs for wildland fire suppression and fuels management in GRSG habitat.

Under Alternative A, wildfires would likely continue to increase in size and frequency in seven of the nine populations/subpopulations in the sub-region. GRSG would subsequently continue to be degraded or lost. Small and heavily disturbed populations with dominance of invasive annual grass understory would be particularly susceptible to these impacts. Additionally, there may be some direct and indirect effects on individual GRSG from direct mortality or disturbance due to fire suppression or fuels treatment activities.

Impacts from Wild Horse and Burro Management

Under Alternative A, overall management direction is to manage populations of wild horses and burros to achieve a thriving natural ecological balance with respect to wildlife and other uses. Management would not be based specifically on the habitat needs of GRSG. Horses and burros would be managed at AML with gathers based on gather schedules, budgets, or other priorities, such as emergency gathers during drought periods. Keeping horses and burros at AML would reduce overall impacts on vegetation, especially nesting cover and riparian brood-rearing habitats during periods of drought.

Impacts from Leasable Minerals Management

Within the sub-region, most public lands are open to fluid mineral leasing. Specific closures of areas to leasing such as ACECs or crucial or essential wildlife habitat exist throughout the sub-region.

Fluid minerals include oil and gas and geothermal (See **Section 4.3.2**, Nature and Types of Effects). Currently, 16,061,900 acres of PPH and PGH are managed as open to fluid minerals leasing and 1,670,800 acres of PPH and PGH as closed to fluid minerals leasing for particular ROWs, designated wilderness areas, ACECs, and other administrative needs. However, none of these acres were designated to protect GRSG habitat. Lands closed to fluid minerals leasing comprise 1,296,100 acres of PPH and 374,700 acres of PGH, respectively. Within modeled nesting habitat, there are 834,600 acres of PPH and PGH combined, which are closed to fluid mineral leasing. Closed areas provide an increased level of protection to modeled nesting habitat associated with leks representing 32 percent of the GRSG population for the sub-region, and by sub-population (See **Table 4-3**, Alternative A: Percent of GRSG Sub-Populations Affected by Closure to Oil and Gas Leasing).

Table 4.3. Alternative A: Percent of GRSG Sub-Populations Affected by Closure to Fluid Mineral Leasing

Sub-Population	Percent
Central Nevada	26
Southeast Nevada	39
Northwest Interior	0
Quinn Range	0
North-central Nevada	31
Northeast Nevada	13
South-central Oregon/North-central Nevada	43
Northeast California/Northwest Nevada	53
Warm Springs Valley	78
Source: BLM and Forest Service 2013	

Impacts from Locatable Minerals Management

Lands within the sub-region are generally open to mineral location. There are specific locatable mineral withdrawals to protect other uses and resources, but none specific to protecting GRSG habitat. All locatable mineral activities are managed under the Surface Management Regulations at 43 CFR Part 3809, and 36 CFR Part 228. Mitigation of effects on GRSG and its habitat are identified through the NEPA process approving plans of operation. Goals and objectives for locatable minerals are to provide opportunities to develop the resource while preventing undue or unnecessary degradation of public lands.

Lands withdrawn from locatable mineral entry comprise 1,296,100 acres of PPH and 374,700 acres of PGH. Withdrawal within modeled GRSG nesting habitat includes 834,600 acres of PPH and PGH combined. Current withdrawals restrict mineral development and provide an increased level of protection to modeled nesting habitat associated with leks representing 32 percent of the GRSG population for the sub-region, and represented by the sub-population (See **Table 4-4**, Alternative A: Percent of GRSG Sub-Populations Affected by Withdrawal).

Table 4.4. Alternative A: Percent of GRSG Sub-Populations Affected by Withdrawal

Sub-Population	Percent
Central Nevada	26
Southeast Nevada	37
Northwest Interior	0
Quinn Range	0
North-central Nevada	31
Northeast Nevada	13
South-central Oregon/North-central Nevada	43
Northeast California/Northwest Nevada	56
Warm Springs Valley	7
Source: BLM and Forest Service 2013	

Impacts from Salable Minerals Management

Within the sub-region, most public lands are open to mineral material disposal. Specific closures of areas to salable mineral materials such as ACECs or crucial or essential wildlife habitat exist throughout the sub-region.

Currently, there are 16,061,900 acres open to material disposal and 1,670,800 acres closed within PPH and PGH. Lands closed to mineral material disposal comprise 1,296,100 acres of PPH and 374,700 acres of PGH respectively. Within modeled nesting habitat, there are 834,600 acres of PPH and PGH combined. Closed areas provide an increased level of protection to modeled nesting habitat associated with leks representing 32 percent of the GRSG population for the sub-region, and represented by sub-population (See **Table 4-5**, Alternative A: Percent of GRSG Sub-Populations Affected by Closure to Salables).

Table 4.5. Alternative A: Percent of GRSG Sub-Populations Affected by Closure to Salables

Sub-Population	Percent
Central Nevada	26
Southeast Nevada	39
Northwest Interior	0
Quinn Range	0
North-central Nevada	31
Northeast Nevada	13
South-central Oregon/North-central Nevada	45
Northeast California/25Northwest Nevada	56
Warm Springs Valley	0
BLM and Forest Service 2013	

Impacts from Land Uses and Realty Management

Under Alternative A, all BLM-administered lands are held in retention unless identified for disposal. Disposal criteria typically include considerations of sensitive or crucial resources such as wildlife habitat. While most LUPs in the sub-region do not have specific goals

related to GRSG, some newer plans, such as those in California and the Ely District Office in Nevada, do have specific avoidance and exclusion areas, seasonal buffers, and seasonal timing restrictions related to GRSG disturbance and habitat. Land tenure adjustments would be subject to current disposal/exchange/acquisition criteria, which include retaining lands with threatened or endangered species, high quality riparian habitat, or plant and animal populations or natural communities of high interest. While not explicitly stated in some existing LUPs, particularly those in Nevada, this would likely include retention of areas with GRSG, and would thus retain occupied habitats under BLM administration. This would reduce the likelihood of habitat conversion to agriculture, urbanization, or other uses that would remove sagebrush habitat. Mitigation is typically developed under the NEPA process, and most ROW and surface developments are subject to limited operation periods or other stipulations in local GRSG conservation strategies. This alternative stipulates 114,200 acres of avoidance areas within existing PPH/PGH where certain actions would be considered on a case by case basis and 276,600 acres for ROW/SUA exclusion within PPH/PGH where all development would be prohibited. Exclusion would affect 169,600 acres of PPH and avoidance at approximately 101,000 acres of PPH. Acres identified as available for disposal within PPH and PGH total 336,300 under Alternative A. Under this alternative, avoidance areas provide an increased level of protection to modeled nesting habitat associated with leks representing 3 percent of the GRSG population in the sub-region, and exclusion areas provide an increased level of protection to 12 percent of the modeled sub-region population. These management actions would be expected to reduce both direct and indirect impacts on GRSG.

Impacts from Renewable Energy Management

In 2005 and 2008, the BLM programmatically amended its LUPs for renewable energy resources through the Wind Energy PEIS and Geothermal PEIS, respectively. These programmatic documents outline public lands available and unavailable for these resource uses and provide direction on processing ROWs and geothermal lease applications as well as establishing BMPs for conducting these activities on BLM-administered lands. The BMPs contain some general guidance for addressing GRSG and its habitat. LUPs would continue to have different stipulations for geothermal resources and under Alternative A, 8,196,700 acres could be allocated for solar development.

Under Alternative A, 276,600 acres are managed for exclusion and 114,200 acres are managed for avoidance of wind energy within existing PPH/PGH. Outside these areas, there would be more impacts on GRSG and their habitat than inside the areas excluded or avoided. Impacts on GRSG and their habitat from construction and operation of wind energy facilities are discussed under Nature and Type of Effects, above. Management under Alternative A allows for high use of GRSG habitat for wind energy and would lead to more impacts than Alternatives D and F.

Management under Alternative A includes 1,492,800 acres in the Solar PEIS variance areas within PPH/PGH. In areas where solar energy facilities are permitted, there would be more impacts on GRSG and their habitat than in areas where solar energy facilities are excluded. Impacts similar to wind energy would be expected. Under Alternative A, management allows for high use of GRSG habitat for wind energy and would lead to more impacts than Alternatives C and D.

Impacts from Wind Energy Development on GRSG Sub-Populations

Within the sub-region, most areas of public land would remain open for wind development, with 276,600 acres of PPH and PGH managed as existing ROW/SUA exclusion and 2,216,500 acres of

PPH and PGH managed as ROW/SUA avoidance for wind energy. This represents 16 percent of the available PPH and PGH in the planning area being subject to exclusion or avoidance.

There are 983,600 of exclusion acres and 89,200 of avoidance acres of PPH and PGH within modeled nesting habitat. Proposed exclusion and avoidance areas provide an increased level of protection to modeled nesting habitat associated with leks representing 3 percent of the population for avoidance areas and 8 percent of the population for the sub-region, and as represented by the GRSG sub-population data (see **Table 4-6**, Alternative A: Percent of GRSG Sub-Populations Affected by ROW/SUA Exclusion or Avoidance).

Table 4.6. Alternative A: Percent of GRSG Sub-Populations Affected by ROW/SUA Exclusion or Avoidance

Sub-Population	Percent Affected	
	Exclusion	Avoidance
Central Nevada	12	0
Southeast Nevada	38	0
Northwest Interior	0	0
Quinn Range	0	0
North-central Nevada	0.2	0
Northeast Nevada	6	2
South-central Oregon/ North-central Nevada	0	0
Northeast California/ Northwest Nevada	2	10
Warm Springs Valley	0	0
Source: BLM and Forest Service 2013		

Impacts from Solar Energy Development on Sub-populations

Within the sub-region, most public lands are excluded from solar development. Areas potentially available to solar development include designated Solar Energy Zones, which are considered open. The Final Solar Programmatic EIS states that occupied GRSG habitat and Solar Energy Zones do not overlap (BLM 2012h). Some areas, termed Solar Variance Areas, within PPH and PGH remain available for application for solar development. Solar Variance Areas are considered to be avoidance.

Under this alternative, 1,492,800 acres of PPH and PGH would be designated as Solar Variance and would remain open to application for solar development within the sub-region. This alternative leaves the remaining PPH and PGH (16,240,100 acres) closed to solar development.

There are 14,883,500 acres of PPH and PGH for exclusion and 924,800 acres that would be designated as Solar Variance (avoidance) within modeled nesting habitat. Variance areas provide a level of protection to modeled nesting habitat associated with leks representing 10 percent of the GRSG population for the sub-region, and represented by sub-population table (see **Table 4-7**, Alternative A: Percent of GRSG Sub-Populations Affected by Solar Energy).

Table 4.7. Alternative A: Percent of GRSG Sub-Populations Affected by Solar Energy Variance Areas

Sub-Population	Percent
Central Nevada	25
Southeast Nevada	41

Sub-Population	Percent
Northwest Interior	40
Quinn Range	0
North-central Nevada	0
Northeast Nevada	0
South-central Oregon/ North-central Nevada	0
Northeast California/ Northwest Nevada	0
Warm Springs Valley	7

Source: BLM and Forest Service 2013

Impacts from Comprehensive Travel and Transportation Management

Under current management, TMAs have not been consistently identified in LUPs beyond the basic allocations of open, closed, and limited. Closed areas are comprised of congressionally designated areas, Wilderness Study Areas, and as directed by some ACECs and are retained through all alternatives. Areas limited to existing/designated roads include Forest Service-administrated lands, non-wilderness portions of the Black Rock/High Rock National Conservation Area, and all non-wilderness portions of the recently completed California BLM LUPs (2008), which include northeastern California and northwestern Nevada.

Impacts on GRSG from recreation are well documented (See **Section 4.3.2**, General Nature and Types of Effects). Comprehensive Travel and Transportation involves the regulation of off-road use by motorized vehicles. Off-road motorized vehicle use can impact GRSG habitat by causing habitat loss and fragmentation, invasive plant spread, induced displacement or avoidance behavior, creation of movement barriers, noise, and direct encounters (Knick et al. 2011). Reducing the extent and influence of roads and trails, and the areal extent of off-road use would be expected to reduce impacts associated with these activities. Cross-country vehicle travel is most prevalent after wet conditions have abated, particularly during the late summer/fall hunting seasons. Juvenile GRSG become increasingly mobile during late summer through the winter and are less impacted by random vehicle disturbance during this period. The effect of limiting vehicular access to existing roads is minor but of note during these time periods. For comparison of impacts, the acreage designated closed, limited, or open can provide a direct comparison among alternatives.

Under current management, 874,600 acres are closed to motorized vehicles, 4,113,300 acres are limited to existing routes for motorized vehicles, and 12,745,000 acres are open to all modes of cross country travel (see **Table 4-8**, Alternative A: Acres of GRSG Habitat and Sub-region Populations within Travel Management Designations).

Table 4.8. Alternative A: Acres of GRSG Habitat and Sub-region Populations within Travel Management Designations

Allocation	PPH	PGH	Modeled Nesting Habitat	% Sub-region Population Affected
	(acres)			
Closed	731,000	143,600	834,600	20
Limited	3,083,600	1,029,700	3,681,900	49
Open	8,878,900	3,866,100	11,292,000	77

Source: BLM and Forest Service 2013

Table 4-9, Alternative A: GRSG Sub-Populations Affected by Travel Management Designations of Closed and Limited, depicts population effects by percent sub-population.

Table 4.9. Alternative A: GRSG Sub-Populations Affected by Travel Management Designations of Closed and Limited

Sub-Population	Percent	
	Closed	Limited
Central Nevada	3	50
Southeast Nevada	23	37
Northwest Interior	0	0
Quinn Range	0	0
North-central Nevada	31	50
Northeast Nevada	8	30
South-central Oregon/ North-central Nevada	42	29
Northeast California/ Northwest Nevada	43	81
Warm Springs Valley	0	100
Source: BLM and Forest Service 2013		

4.3.5. Alternative B

Impacts from Vegetation and Soils Management

Under Alternative B, restoration projects would be prioritized in seasonal GRSG habitats thought to be limiting the distribution and abundance of GRSG. Re-establishment of sagebrush cover and desirable understory plants would be the highest priority for restoration efforts. Restoration treatments would incorporate habitat parameters defined by Connelly et al. 2000, Hagen et al. 2007, and state GRSG conservation plans. Native seed would be required for restoration treatments and the establishment of designated seed harvest areas for sagebrush seed collection in fire prone areas. Climate change would be a consideration when proposing native seed collection. In addition, post-restoration management plans would be implemented to ensure long-term persistence of vegetation treatments.

Alternative B management prescriptions for vegetation and soil applied to PPMAs (12,693,500 acres) and PGMAs (5,039,400 acres) would provide greater protection and restoration efforts for GRSG habitat compared with those under Alternative A.

Management under Alternative B would ensure the long-term availability and resiliency of native seed for restoration treatments by establishing native seed harvest areas which incorporate climate change effects. This and post-treatment management plans would provide long-term beneficial impacts by improving the success of restoration treatments and the future persistence of GRSG and their habitat.

Vegetation treatment rates would be greater than under Alternative A and would further reduce the impacts of invasive grasses, affecting seven of nine population/subpopulations where invasive grasses are a substantial threat. Treatment rates would further reduce the impacts of conifer encroachment on four of nine population/subpopulations where conifer is a substantial threat. VDDT modeled trends for habitat projected at 10 and 50 years would improve compared with Alternative A.

Impacts from Livestock Grazing Management

Under Alternative B, the same number of acres would be open to livestock grazing as under Alternative A, with the same number of acres of modeled nesting habitat affected within the sub-region. Agencies, in coordination with permittees, would prioritize a number of management actions in PPMAs to incorporate GRSG habitat objectives and management considerations into livestock grazing management, though there would be no change to the acreage open for grazing or available AUMs unless an allotment is retired from grazing. Management actions would include developing specific vegetation objectives based on ESDs to conserve, enhance, or restore PPMAs habitat and riparian areas would be managed to achieve proper functioning condition. Vegetation treatments to increase livestock forage would only be allowed if they conserved, enhanced or restored GRSG habitat. This alternative would also implement modifications to season of use, numbers of livestock or livestock types to meet seasonal GRSG requirements. New water developments would only be authorized when they would benefit PPMAs. In PPMAs, older developments would also be analyzed in order to determine if modifications of the system are necessary to maintain the integrity of the riparian area. Removal, modification, or marking of fences would be considered under this alternative.

This alternative would provide long-term benefits to GRSG through implementation of management actions that would improve both upland and riparian GRSG habitats, and both short- and long-term impacts on their seasonal ranges. Compared with Alternative A, Alternative B management actions would further reduce, but would not eliminate, impacts from grazing on GRSG and their habitat.

Impacts from Fire and Fuels Management

Under Alternative B, impacts on GRSG from fire suppression activities would be largely the same as Alternative A. On BLM- and Forest Service-administered lands, 12,693,500 acres of GRSG habitat would be designated as PPMAs and 5,039,400 acres would be designated as PGMAs. With regard to fuels management projects GRSG would benefit from the direction provided to protect important aspects of habitat within PPMAs (e.g., canopy cover, etc.). Hazardous fuels projects focused on protecting GRSG habitat would be prioritized in these areas. Any fuels treatment in sagebrush would carefully consider if there is a net benefit for GRSG prior to implementation, and fuels treatments would not be allowed in winter habitat. Prescribed fire in low precipitation areas (less than 12 inches) would generally not be allowed. Post-fire rehabilitation would be conducted using primarily native species, based on availability and adaptation. Rest from grazing would be required for two full growing seasons, unless vegetation recovery dictates otherwise. These activities may decrease the likelihood for fire in GRSG habitats and would help restore GRSG habitat in fire-affected areas. Relative to the amount of GRSG habitat that is expected to burn based on current trends; these actions may provide localized but minimal protections and improvements to seven of the nine populations/subpopulations in the sub-region where fire contributes significantly to current declining trends.

Impacts from Wild Horse and Burro Management

Under Alternative B, wild horses and burros would be managed at AML on the same number of acres as Alternative A, with gathers prioritized based on PPMAs habitat and emergency environmental issues. HMA plans when developed or updated would incorporate GRSG habitat objectives. Implementation of any range improvements would follow the same guidance as identified for livestock grazing in this alternative including designing and locating new improvements only where they “conserve, enhance, or restore GRSG habitat through improved grazing management”. Design features could include developing or modifying waters to mitigate

for West Nile virus, removing or modifying fences to reduce the chance of bird strikes, or monitoring and treating invasive species associated with range improvements. Additional range improvements would specifically address the needs of GRSG. Compared with Alternative A, Alternative B would prioritize GRSG habitat objectives in HMA plans and base assessment of AMLs on achieving or maintaining GRSG habitat needs. Compared to Alternative A, Alternative B provides short-term and localized improvements to grass cover and forb availability. This affects nesting and both early and late brood-rearing habitats, where horse gathers have been implemented and for the duration of which herd numbers are appreciably reduced toward AML.

Impacts from Leasable Minerals Management

Management under Alternative B would close 12,693,500 acres of PPMAs to leasing. Within modeled nesting habitat, there would be 10,522,300 acres of PPMAs. Closed lands would provide an increased level of protection to modeled nesting habitat associated with leks representing 94 percent of the GRSG population for the sub-region and by sub-population (See **Table 4-10, Alternative B: Percent of Sub-Populations Affected by Closure to Leasables**). Closure to leasable minerals would result in long-term beneficial impacts on GRSG habitats associated with all seasonal life history requirements. It would do this by reducing disturbance to both habitat and the species at leks, during nesting and brood rearing, and on winter ranges.

Table 4.10. Alternative B: Percent of Sub-Populations Affected by Closure to Leasables

Sub-Population	Percent
Central Nevada	99
Southeast Nevada	100
Northwest Interior	92
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/North-central Nevada	100
Northeast California/ Northwest Nevada	88
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Impacts from Locatable Minerals Management

Management under Alternative B would be more protective than under Alternative A. In addition to withdrawals and processes for management, PPMAs would be proposed for withdrawal from mineral entry and existing mining claims would be subject to validity exams or buy-out. Proposed withdrawal under Alternative B would include 12,693,500 acres of PPMAs. Within modeled nesting habitat there would be 10,522,300 acres of PPMAs. Withdrawn lands would provide an increased level of protection to modeled nesting habitat associated with leks representing 94 percent of the GRSG population for the sub-region and by sub-population (See **Table 4-11, Alternative B: Percent of Sub-Populations Affected by Withdrawals**). Withdrawal from locatable mineral entry would result in long-term beneficial impacts on GRSG habitats associated with all seasonal life history requirements. It would do this by reducing disturbance to both habitat and the species at leks, during nesting and brood rearing, and on winter ranges.

Table 4.11. Alternative B: Percent of Sub-Populations Affected by Proposed Withdrawals

Sub-Population	Percent
Central Nevada	99
Southeast Nevada	100
Northwest Interior	92
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/North-central Nevada	100
Northeast California/ Northwest Nevada	88
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Impacts from Salable Minerals Management

Management under Alternative B would be more protective than Alternative A and would close PPMAs to mineral material sales.

Alternative B closes 12,693,500 acres of PPMAs to mineral material sales (10,522,300 acres of PPMAs in modeled nesting habitat). Closed lands would provide an increased level of protection to modeled nesting habitat associated with leks representing 94 percent of the GRSG population for the sub-region and by sub-population (See **Table 4-12**, Alternative B: Percent of Sub-Populations Affected by Closure to Salables). Closure to salables increases long-term protection of leks and nesting habitat, as depicted in Table 4-12. It would also reduce habitat and species disturbance during the remaining seasonal life history phases, including brood rearing and wintering.

Table 4.12. Alternative B: Percent of Sub-Populations Affected by Closure to Salables

Sub-Population	Percent
Central Nevada	99
Southeast Nevada	100
Northwest Interior	92
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/North-central Nevada	100
Northeast California/ Northwest Nevada	88
Warm Springs Valley	100
BLM and Forest Service 2013	

Impacts from Land Uses and Realty Management

Under Alternative B, more habitat would be managed as ROW/SUA avoidance (4,932,400 acres) and exclusion (12,693,500 acres) areas than under Alternative A. There is an approximate 233,900-acre difference between both alternatives in terms of acres for disposal, with Alternative B having fewer acres. PPMAs would be made into exclusion areas, with some exceptions, for new ROW and special use authorizations. Mitigation and restoration efforts would take place related to existing ROWs in PPMAs. In general habitat, avoidances areas would be set up in relation to new ROWs, collocating ROWs as much as possible. Under Alternative B, PPMAs

would be retained unless mitigation or land exchange would better benefit GRSG habitat. Avoidance areas provide an increased level of protection to modeled nesting habitat associated with leks representing 64 percent of the sub-regional population, and exclusion areas provide an increased level of protection to 94 percent of the modeled sub-regional population. In relation to Alternative A, management under Alternative B would provide fewer direct impacts on GRSG by greatly increasing acreage subject to ROW/SUA avoidance and exclusion and by protection and acquisition of important GRSG habitats. ROW/SUA exclusion and avoidance would result in long-term beneficial impacts on GRSG habitats associated with all seasonal life history requirements. It would do this by reducing disturbance to both habitat and the species at leks, during nesting and brood rearing, and on winter ranges.

Impacts from Renewable Energy Management

Under Alternative B, impacts from management of lands for wind and solar energy development would be the same as for Alternative A.

Impacts from Wind Energy Development on Sub-populations

Alternative B does not specify exclusion or avoidance areas specifically for GRSG conservation. Because a specific action was not specified under Alternative B, the default is that the same action would be taken for Alternative B as proposed for Alternative A.

Within the sub-region, most areas of public land would remain open for wind energy development. 276,600 acres of PPMAs and PGMAs would be excluded and 114,200 acres of PPMAs and PGMAs would have ROW/SUA avoidance for wind energy development. This represents 4 percent of the available PPMAs and PGMAs in the planning area being excluded or avoided in the planning area.

In the sub-region, within modeled nesting habitat there are 983,600 of exclusion and 89,200 of avoidance acres of PPMAs and PGMAs. Proposed ROW/SUA exclusion and avoidance areas provide an increased level of protection to modeled nesting habitat associated with leks (see **Table 4-13**, Alternative B: Percent of GRSG Sub-Populations Affected by ROW/SUA Exclusion or Avoidance).

Table 4.13. Alternative B: Percent of GRSG Sub-Populations Affected by ROW/SUA Exclusion or Avoidance

Sub-Population	Percent Affected	
	Exclusion	Avoidance
Central Nevada	99	92
Southeast Nevada	100	96
Northwest Interior	92	44
Quinn Range	0	0
North-central Nevada	100	62
Northeast Nevada	99	59
South-central Oregon/ North-central Nevada	100	100
Northeast California/ Northwest Nevada	87	30
Warm Springs Valley	100	100
BLM and Forest Service 2013		

Impacts from Solar Energy Development on Sub-populations

Alternative B does not specify exclusion and avoidance areas specifically for GRSG conservation. Because a specific action was not specified under Alternative B, the default is that the same action would be taken for Alternative B as proposed for Alternative A.

Within the sub-region, most public lands are excluded from solar development. Areas potentially available to solar development include designated Solar Energy Zones, which are considered open. The Final Solar Programmatic EIS states that occupied GRSG habitat and Solar Energy Zones do not overlap (BLM 2012h). Some areas, termed Variance Areas, within PPH and PGH remain available for application for solar development. Solar Energy Variance Areas are considered as avoidance.

Under this alternative, 1,492,800 acres of PPMAs and PGMAs would be designated as Solar Variance and would remain open to application for solar development within the sub-region. This alternative leaves the remaining PPMA and PGMA (16,240,100 acres) closed or limited to solar development.

There are 14,883,500 acres of PPH and PGH for exclusion and 924,800 acres that would be designated as Solar Variance (avoidance) within modeled nesting habitat. Variance areas provide a level of protection to modeled nesting habitat associated with leks representing 10 percent of the GRSG population for the sub-region, and as represented by the sub-population table (**Table 4-14**, Alternative B: Percent of GRSG Sub-Populations Affected by Solar Energy).

Table 4.14. Alternative B: Percent of GRSG Sub-Populations Affected by Solar Energy Variance

Sub-Population	Percent
Central Nevada	25
Southeast Nevada	41
Northwest Interior	40
Quinn Range	0
North-central Nevada	0
Northeast Nevada	0
South-central Oregon/North-central Nevada	0
Northeast California/Northwest Nevada	0
Warm Springs Valley	7
BLM and Forest Service 2013	

Impacts from Comprehensive Travel and Transportation Management

Under Alternative B, areas designated as open to cross-country travel within PPMAs would be managed as limited for motorized travel with the exception of existing closed areas within PPMAs or PGMAs.

Under Alternative B, 874,000 acres would be subject to existing closures to motorized vehicles, 12,992,100 acres would be limited to existing roads, and 3,866,100 acres would be open to all modes of cross-country travel (See **Tables 4-15**, Alternative B: GRSG Habitat and Sub-region Populations within Travel Management Designations, and **4-16**, Alternative B: GRSG Sub-Populations Affected by Travel Management Designations of Closed and Limited).

Table 4.15. Alternative B: Acres of GRSG Habitat and Sub-region Populations within Travel Management Designations

Allocation	PPMAs	PGMAs	Modeled Nesting Habitat	% Sub-region Population Affected
	(acres)			
Closed	731,000	143,600	834,600	20%
Limited	11,962,500	1,029,600	10,720,200	94%
Open	N/A	3,866,100	N/A	N/A
BLM and Forest Service 2013				

Table 4.16. Alternative B: Percent of GRSG Sub-Populations Affected by Travel Management Designations of Closed and Limited

Sub-Population	Percent Affected	
	Closed	Limited
Central Nevada	3	100
Southeast Nevada	23	100
Northwest Interior	0	92
Quinn Range	0	0
North-central Nevada	31	100
Northeast Nevada	8	100
South-central Oregon/ North-central Nevada	42	100
Northeast California/ Northwest Nevada	43	88
Warm Springs Valley	0	100
BLM and Forest Service 2013		

Alternative B would reduce the potential for random vehicle disturbance to GRSG within PPMAs during all phases of their seasonal life history. Disturbance to GRSG during lekking, and secondarily during nesting, would be the most detrimental impact but is naturally limited by vehicle travel conditions during late winter/early spring. The effect on GRSG of limiting vehicular access to existing roads is minor but of note. Cross-country vehicle travel is most prevalent after wet conditions have abated and particularly during the late summer/fall hunting seasons. Juvenile GRSG become increasingly mobile during late summer through winter and are less impacted by random vehicle disturbance during this period. The effect of limiting vehicular access to existing roads is minor but of note during these times.

4.3.6. Alternative C

Impacts from Vegetation and Soils Management

Under Alternative C, vegetation management would prioritize the restoration of crested wheat seedings back to native vegetative communities and focus fuels treatments in areas of urban interface and significant existing disturbances, establish monitoring sites, require “Risk Assessments,” minimize or eliminate the use of herbicides, address vectors of weed infestations, and require the use of mowers to remove thatch from meadows and to manage existing fuel breaks.

Management prescriptions under Alternative C would focus vegetation treatments in unoccupied GRSG habitats (e.g., crested wheat grass seeding, urban interface, areas where livestock

management infrastructure is removed, and other areas of significant disturbances). Broad-scale treatment of invasive grasses is achieved through natural recovery following the removal of livestock. Juniper removal projects would be limited as well.

Given the limited current distribution of suitable GRSG habitat, management plans that strategically protect intact sagebrush and restore impacted areas to enhance existing habitats have the best chance of increasing the amount and quality of GRSG habitat (Manier et al. 2013, p. 171). Management under Alternative C would not prioritize restoration treatments within occupied habitats; therefore, it would decrease the potential for restoring GRSG habitat, compared with Alternative A. Alternative C would also rely on the removal of livestock and a presumption that long-term vegetative would recover over time in the absence of large-scale vegetation treatments. Additionally, VDDT modeling projects habitat trends for 10 and 50 years. It indicates a slight decline from increased influence of invasive grasses and a continued dominance of conifer within impacted populations and subpopulations, compared with Alternative A.

Impacts from Livestock Grazing Management

Under Alternative C, livestock use would be closed on about 17,589,700 acres of PPMA (portions of PPMA are unallotted). About 94 percent of the modeled GRSG population in the sub-region would be affected, and anywhere from 88 to 100 percent of each sub-population. Maintenance of a 6-inch stubble height throughout the grazing season in riparian areas and maintenance of a 9-inch stubble height on the uplands would be mandated as part of this alternative. As needed, livestock would be reduced rather than moved into other sagebrush sites under this alternative. Under this alternative, both passive and active restoration would occur including, removal of livestock, roads, water developments, fences, and other range infrastructure that may contribute to GRSG predators or increase habitat for mosquitoes that may carry the West Nile virus. Additional active restoration would include reseeding of roads and crested wheatgrass seedings with native shrubs and grasses.

Under Alternative C, grazing impacts on GRSG would be reduced compared with Alternative A. Potential trampling of nests would be eliminated since no grazing would occur during the nesting season and the potential for direct impacts from livestock turnout activities would also be reduced or eliminated. The necessary reduction in livestock numbers under this alternative would result in greater amounts of residual upland cover both in the short term and long term. Removal of fencing would reduce the potential of GRSG direct strikes and reduce the potential for predation. However, fence removal would increase negative impacts on brood-rearing habitats from wild horses and burros having access to more riparian sites. Removal of troughs and other artificial watering devices would make more water available on the ground for GRSG, their habitats, and other wildlife species.

Impacts from Fire and Fuels Management

Under Alternative C, impacts on GRSG from wildfire suppression and fuels management would be the same as Alternative B; 17,732,900 acres of GRSG habitat would be designated as PPMAs. However, this alternative adopts a passive restoration approach relying on a long-term improvement of habitat conditions by closing PPMAs (17,589,700 acres) to livestock grazing. The alternative does not rely on presuppression infrastructure, such as fuelbreaks, to limit the impacts of fire and limits cheatgrass control to natural restoration over chemical treatment, which is restricted. The combination of reducing the direct measures to combat invasive species and limit fire spread would increase the likelihood of continued GRSG habitat decline within seven of the nine GRSG populations/subpopulations.

Impacts from Wild Horse and Burro Management

Under Alternative C, wild horses and burros would be managed on the same HMA/WHBT acreage as under Alternative A. Horses and burros would be managed at AML. However, AML establishment would be analyzed in conjunction with livestock numbers during grazing permit renewals and land health assessments. Use of contraceptives and other population growth suppression to manage wild horse and burro numbers would be similar to actions under Alternative A. Management under Alternative C would not allow the use of helicopters for gathers and would be expected to lead to decreased gather efficiency, resulting in increases of wild horses and burros beyond AML. Combined with the removal of some fences during “active restoration” processes related to livestock grazing, horses and burros would be expected to range over a larger area than under Alternative A and would necessitate the need for increased gather outside of HMA/WHBT boundaries. The increase in access to riparian and upland habitats that are currently protected by fences, and expected temporary increases in horses and burros over AML, would over time reduce food and cover for GRSG and reduce water holding capacities of riparian brood-rearing sites compared with Alternative A.

Impacts from Leasable Minerals Management

Management under Alternative C would afford the highest level of protection of all alternatives. Mineral leasing would be precluded for all ACECs, including all PPMA, under this alternative. Closed acreage would include all PMUs in the sub-region, protecting all occupied or potentially occupied GRSG habitat and an increasing the level of protection to all associated populations and sub-populations (Table 4-17, Alternative C: Percent of GRSG Sub-Populations Affected by Closure to Leasables).

Table 4.17. Alternative C: Percent of GRSG Sub-Populations Affected by Closure to Leasables

Sub-Population	Percent
Central Nevada	100
Southeast Nevada	100
Northwest Interior	96
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	88
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Table 4.18. Alternative C: Percent of GRSG Sub-Populations Affected by Closure to Leasables

Sub-Population	Percent
Central Nevada	100
Southeast Nevada	100
Northwest Interior	96
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100

Sub-Population	Percent
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	88
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Impacts from Locatable Minerals Management

Management under Alternative C would afford the highest level of protection of all alternatives. Mineral entry withdrawal would be recommended for all ACECs, including all PPMAs, under this alternative. This would also include all PMUs in the sub-region, protecting all occupied or potentially occupied GRSG habitat and an increasing the level of protection to all associated populations and sub-populations.

Management under Alternative C would withdraw PPMAs to locatable mineral entry (17,732,900 acres). Within modeled nesting habitat, there are 15,485,100 acres of PPMA. Withdrawal would increase protection of all acres of PPMA within modeled nesting habitat associated with leks, which would impact 97 percent of the GRSG population for the sub-region, and by sub-population below (**Table 4-18**, Alternative C: Percent of GRSG Sub-Populations Affected by Withdrawals).

Table 4.19. Alternative C: Percent of GRSG Sub-Populations Affected by Withdrawals

Sub-Population	Percent
Central Nevada	100
Southeast Nevada	100
Northwest Interior	96
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	88
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Impacts from Salable Minerals Management

Management under Alternative C would close PPMA to mineral materials sales, providing the highest level of protection among the alternatives (same as Alternative D; See **Table 4-19**, Alternative C: Percent of GRSG Sub-Populations Affected by Closure to Salables).

Table 4.20. Alternative C: Percent of GRSG Sub-Populations Affected by Closure to Salables

Sub-Population	Percent
Central Nevada	100
Southeast Nevada	100
Northwest Interior	96
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/North-central Nevada	100

Sub-Population	Percent
Northeast California/Northwest Nevada	88
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Management under Alternative C would close PPMA (17,732,900 acres) to mineral material disposal. Within modeled nesting habitat, there are 15,485,100 acres of PPMA and PGMA combined. Closure would increase protection of all acres of PPMA within modeled nesting habitat associated with leks. This would impact 97 percent of the GRSG population for the sub-region and by sub-population.

Impacts from Land Uses and Realty Management

Under Alternative C, ROW/SUA avoidance acres would remain the same as under Alternative A. Within PPMA, there are more acres managed as ROW/SUA exclusion under Alternative C (17,732,900 acres) than under Alternative A (276,600 acres). This difference would provide protections to more of the modeled sub-regional GRSG population than Alternative A, about 94 percent of the modeled population. This difference is due to resource use restrictions in all PPMAs as well as potential ACECs. Acres identified for disposal are less than Alternative A. Under Alternative C, all public lands in proposed ACECs (all PPMAs) and identified restoration and rehabilitation lands would be retained in public ownership. New corridors or facilities including communication towers would only be allowed in non-habitat areas with existing towers undergoing reviews for adverse effects. All existing transmission or pipeline corridors would be assessed under this alternative and ROWs or Forest Service authorizations amended to require features that enhance GRSG habitat security. This alternative would result in fewer direct or indirect impacts on GRSG and their habitats under compared with Alternative A due to most effects from the land and realty program occurring outside of occupied habitat and effects within current ROWs being minimized over time. Additionally, this alternative would prioritize more areas for acquisition compared with Alternative A.

Impacts from Renewable Energy Management

Alternative C would prohibit development from all PPMAs.

Management under Alternative C would close both ACECs and occupied GRSG habitats to large-scale solar development. Alternative C provides the highest level of protection for sagebrush habitat of all the alternatives, with 17,732,900 acres of ROW/SUA exclusion for solar development in PPMAs.

Closure would increase protection of all acres of PPMAs within modeled nesting habitat associated with leks, which would impact 97 percent within exclusion areas. This alternative further buffers wind development outside of PPMA by 5 to 10 miles, affording additional protection to potential and unoccupied habitats adjacent to PPMA. This alternative eliminates the impacts from renewable energy development on GRSG and its habitat in all seasonal ranges.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative C, PPMAs would be managed as limited to motorized travel with the exception of existing closed areas.

4.3.7. Alternative D

Impacts from Vegetation and Soils Management

Management under Alternative D would focus on vegetation management within PPMAs and PGMAs with a goal of maintaining a resilient sagebrush vegetative community, restoring sagebrush communities to reduce habitat fragmentation, and maintaining and re-establishing habitat connectivity over the long term. Management actions include vegetation effectiveness research; region-specific GRSG Habitat Objectives that consider life requisite, habitat indicators and objectives to be incorporated in proposed vegetation treatments across all resource programs; management of lotic and lentic riparian areas; seeding and seedling treatments for areas affected by wildfire; use of native seed; evaluation of treatments at a landscape scale; use of fire resistant species for fuel breaks; resting of grazing allotments pre- and post-treatment; monitoring and control of invasive species; prioritizing treatments in winter habitat by enhancing or reducing wildfire risk; and increasing edge habitat adjacent to riparian areas.

Management under Alternative D would provide for specific on the ground management objectives for vegetation treatments which are categorized by GRSG seasonal habitat requirements. This would allow for attainment of the appropriate treatments to be applied on the ground and a set of common goals and objectives being met throughout the sub-region. Management under Alternative D would require one year of pre-treatment rest from cattle grazing and two years of rest post-treatment. This requirement coupled with vegetation effectiveness research and meeting specific seasonal habitat objectives would increase the success of treatments being implemented compared with Alternative A (see **Table 2-6**, Proposed Habitat Objectives for Greater Sage-Grouse). VDDT modeling projects that habitat trends for 10 and 50 years would improve, compared with Alternative A, and would be similar to Alternative B.

Impacts from Livestock Grazing Management

Management actions under Alternative D would be similar to those under Alternative B. Actions described under this alternative would provide both short-term (less disturbance) and long-term (habitat) benefits to GRSG. Compared with Alternative A, Alternative D management actions would further reduce, but would not eliminate, impacts from grazing on GRSG and their habitat.

Impacts from Fire and Fuels Management

Effects on GRSG from wildfire and fuels management under Alternative D would be similar to, but less than Alternative B. Impacts on GRSG are expected to be slightly less due to fuels management treatments and post-fire rehabilitation projects in PPMAs, which are focused on maximizing benefits on GRSG. Fuel breaks would be implemented to better contain wildfires, and during firefighting operations sagebrush habitat would be protected to the extent possible as a valuable resource. See discussion under Alternative B, *Impacts from Fire and Fuels Management*.

Relative to the amount of GRSG habitat that is expected to burn based on current trends; these actions may provide localized but minimal protections and improvements to seven of the nine populations/subpopulations in the sub-region where fire contributes significantly to current declining trends.

Impacts from Wild Horse and Burro Management

Under Alternative D, gathers would be prioritized in PPMA habitat but the management would be similar to Alternative B, with the same percentage of modeled overall GRSG population affected as under Alternative A. As under Alternative B, Alternative D would be expected to produce similar results as Alternative A. However, beneficial effects on GRSG and PPMA would accrue more quickly due to the prioritization of gathers based on importance to GRSG habitat.

Overall, as under Alternative B, Alternative D provides significant, short-term, and localized improvements to grass cover and forb availability. This would affect nesting and both early and late brood-rearing habitats where horse gathers have been implemented and for the duration of which herd numbers are appreciably reduced toward AML.

Impacts from Leasable Minerals Management

Fluid Mineral Leasing

Management under Alternative D would allow leasing on all lands with federal fluid mineral estate. Within PPMA and PGMA, leasing would only be allowed with NSO stipulations. Waivers, exceptions, or modifications would not be considered in PPMA and would be considered in PGMA. Management under Alternative D would provide NSO restrictions to all PPMA and PGMA.

Management under Alternative D would include 12,693,500 acres of PPMA and 5,039,400 acres of PGMA (all PPMA and PGMA within the sub-region). Within modeled nesting habitat, there are 15,485,100 acres of PPMA and PGMA combined. NSO stipulations would provide an increased level of protection to all acres of PPMA and PGMA within modeled nesting habitat associated with leks, which would impact 97 percent of the GRSG population for the sub-region, and by sub-population below (**Table 4-20**, Alternative D: Percent of GRSG Sub-Populations Affected by NSO Stipulations for Leasing).

Table 4.21. Alternative D: Percent of GRSG Sub-Populations Affected by NSO Stipulations for Leasing

Sub-Population	Percent
Central Nevada	100
Southeast Nevada	100
Northwest Interior	96
Quinn Range	0
North-central Nevada	100
Northeast Nevada	100
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	82
Warm Springs Valley	100
Source: BLM and Forest Service 2013	

Impacts from Locatable Minerals Management

Same as Alternative A.

Impacts from Salable Minerals Management

Same as Alternative C.

Impacts from Land Uses and Realty Management

PPMAs and PGMAs would be managed to reduce fragmentation and enhance connectivity under Alternative D. Under this alternative, more acres would be managed as ROW/SUA avoidance than under Alternative A. PPMAs would be managed as ROW/SUA exclusion areas for large-scale wind and solar energy development, and ROW/SUA avoidance for all other ROWs and Forest Service authorizations. Road ROWs would be authorized based on public safety or administrative needs. Development could occur in avoidance areas with appropriate RDFs. Like Alternative A, in PPMAs and PGMAs, new utilities would be co-located with existing surface ROWs. PGMAs would be managed as ROW/SUA avoidance for new communication site ROWs or SUAs. BLM ROW exclusion areas and Forest Service SUA no disturbance areas would be the same as under Alternative A. ROW/SUA avoidance acreage provides a level of protection affecting 94 percent of the modeled sub-regional GRSG population, with ROW/SUA exclusion acreage providing a level of protection affecting 9 percent of the modeled sub-regional population.

Management under Alternative D would apply avoidance criteria throughout PPMAs and PGMAs resulting in greater control of impacts on GRSG in these habitats than would occur under Alternative A. Exclusion areas under Alternative D would be the same as under Alternative A; therefore, impacts would be expected to be the same. Fewer acres would be identified for disposal under Alternative D than under Alternative A.

Impacts from Renewable Energy Management

Under Alternative D, all PPMAs (12,927,400 acres) and all PGMAs (5,039,400 acres) would be managed as ROW/SUA exclusion for wind energy facilities. This alternative, along with Alternative F which has the same provision, would have fewer impacts on GRSG than Alternative A.

Under Alternative D, PPMAs and PGMAs would be managed as ROW/SUA exclusion for wind facilities. This level of closure provides the maximum preservation of sagebrush habitat. Of the 17,732,900 acres of PPMAs and PGMAs in the planning area, 17,732,900 acres would be managed as ROW/SUA exclusion and 0 acres would be managed as ROW/SUA avoidance under Alternative D. This represents 100 percent of the PPMAs and PGMAs in the planning area.

In the sub-region, within modeled nesting habitat there are 12,202,900 acres proposed for ROW/SUA exclusion and an additional 89,200 acres proposed for ROW/SUA avoidance within PPMAs and PGMAs. Proposed exclusion and avoidance areas provide an increased level of protection to modeled nesting habitat associated with leks represented by 94 percent of the modeled GRSG population for the sub-region within the closure and exclusion proposed by this alternative. GRSG sub-populations affected by exclusion or avoidance are shown in **Table 4-21**, Alternative D: Percent of GRSG Sub-Populations Affected by ROW/SUA Exclusion or Avoidance.

Table 4.22. Alternative D: Percent of GRSG Sub-Populations Affected by ROW/SUA Exclusion or Avoidance

Sub-Population	Percent Affected	
	Exclusion	Avoidance
Central Nevada	12	100
Southeast Nevada	37	100
Northwest Interior	0	96
Quinn Range	0	0

Sub-Population	Percent Affected	
	Exclusion	Avoidance
North-central Nevada	0	100
Northeast Nevada	5	99
South-central Oregon/ North-central Nevada	0	100
Northeast California/ Northwest Nevada	2	87
Warm Springs Valley	0	100

Source: BLM and Forest Service 2013

The exclusion of wind energy developments from PPMAs and PGMAs eliminates the impact of tall structures, which GRSG avoid during all phases of their seasonal life cycle. Exclusion also eliminates the need for additional infrastructure development, which further degrades and fragments GRSG habitat.

Impacts from Solar Energy Development

Under Alternative D, PPMAs and PGMAs would be managed as ROW/SUA exclusion for new solar energy facilities. This would provide a high level of protection for sagebrush; excluding 17,773,300 acres of sagebrush habitat from new development.

Beneficial impacts on GRSG are similar to those described above for wind energy development under Alternative D.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative D, areas designated as open to cross-country travel within PPMAs and PGMAs from Alternative A would be managed as limited to motorized travel, making it the most limiting to travel management designations.

Under Alternative D within PPMA and PGMA, the current 874,000 acres remain closed to motorized vehicles, as carried forward under Alternative A. Alternative D limits vehicular travel to existing roads on 16,858,200 acres and retains 0 acres open to all modes of cross-country travel (see **Table 4-22**).

Table 4.23. Alternative D: GRSG Habitat and Sub-region Populations within Travel Management Designations

Allocation	PPMAs	PGMAs	Modeled Nesting Habitat	% Sub-region Population Affected
	(acres)			
Closed	731,000	143,600	834,600	20
Limited	11,962,500	4,895,800	12,172,700	94
Open	N/A	N/A	N/A	N/A

Source: BLM and Forest Service 2013

Alternative D would reduce the potential for random vehicle disturbance to GRSG and their habitats within PPMAs during all phases of their seasonal life history. Disturbance to GRSG during lekking, and secondarily during nesting, would be the most detrimental impact, but it is naturally limited by vehicle travel conditions during late winter/early spring. The effect on GRSG of limiting vehicular access to existing roads is minor but of note. Cross-country vehicle travel is most prevalent after wet conditions have abated and particularly during the late summer/fall hunting seasons. Juvenile GRSG become increasingly mobile during late summer through winter

and are less impacted by random vehicle disturbance during this period. The effect of limiting vehicular access to existing roads is minor but of note during these times.

Table 4-23 depicts population effects by sub-population.

Table 4.24. Alternative D: GRSG Sub-Populations Affected by Travel Management Designations of Closed and Limited

Sub-Population	Percent Affected	
	Closed	Limited
Central Nevada	3	100
Southeast Nevada	22	100
Northwest Interior	0	96
Quinn Range	0	0
North-central Nevada	26	100
Northeast Nevada	8	99
South-central Oregon/ North-central Nevada	42	100
Northeast California/ Northwest Nevada	40	88
Warm Springs Valley	0	100
North-central Nevada	26	100

Source: BLM and Forest Service 2013

4.3.8. Alternative E

Alternative E establishes SGMAs from the Strategic Plan for Conservation of GRSG in Nevada (State of Nevada 2012). SGMAs identify occupied habitat, suitable habitat, potential habitat, and non-habitat within the range of GRSG in Nevada. Within SGMAs, the Nevada Sagebrush Ecosystem Council would work to achieve conservation through a goal of “no net loss” in occupied, suitable, and potential habitats. Alternative E proposes a hierarchical decision-making process for considering planned disturbance or development. The process seeks to avoid disturbance/development, wherever possible, by relocating activities; to minimize disturbance/development through permit conditions to lessen effects; and to mitigate disturbance/development by implementing additional actions that would result in replacement of an asset (mainly habitat) that would be lost as a result of a development action. This alternative limits habitat disturbance to not more than 5 percent per year, per 640 acres, unless habitat treatments show credible positive results, and refers disturbance levels exceeding 5 percent per 640 acres to evaluation and consultation with the Nevada Sagebrush Ecosystem Technical Team. SGMAs apply only to lands within Nevada.

SGMAs include 19.9 million acres of all surface administrations within Nevada. Out of a total of 15.3 million acres of modeled nesting habitat, SGMAs include 11.9 million acres (78 percent). Of 11.9 million acres of PPMAs and 4.9 million acres of PGMAs, SGMAs include 10.7 million acres of PPMAs (91 percent) and 2.3 million acres of PGMAs (47 percent). Using the weighted population model, SGMAs include nesting habitat associated with leks represented by 91 percent of the modeled GRSG population for the sub-region. Due to the lower percentage of PGMAs included in SGMAs, a larger portion of nesting buffers fall outside SGMAs, reducing the amount of nesting habitat supporting the 91 percent population below that provided by the inclusion of all PPMAs and PGMAs in the sub-region (see **Table 4-24**, Alternative E: Percent of GRSG Sub-Populations Supported by SGMAs).

Table 4.25. Alternative E: Percent of GRSG Sub-Populations Supported by SGMAs

Sub-Population	Percent
Central Nevada	98
Southeast Nevada	95
Northwest Interior	0
Quinn Range	0
North-central Nevada	100
Northeast Nevada	98
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	84
Warm Springs Valley	92
Source: BLM and Forest Service 2013	

Alternative E does not provide fixed exclusion or avoidance areas, leaving all management subject to an avoid, minimize, and mitigate approach, which provides a lower level of certainty than alternatives that have fixed exclusion and avoidance land allocations based on PPMAs and PGMAs designations.

Impacts from Vegetation and Soils Management

Under Alternative E, BLM-administered lands in California would be managed similar to Alternative A. BLM-administered lands in Nevada would be managed similar to Alternative D; however, they would be managed over a management footprint defined by SGMAs that matches the PACs defined in the COT Report. SGMAs contain slightly smaller footprints of occupied and suitable habitat than the equivalent combined PPMAs and PGMAs defined in Alternative D. SGMAs also include potential and unoccupied habitat. For federal lands in Nevada, management under Alternative E would limit habitat improvement projects within GRSG habitats, unless treatments show credible positive results through the direction of the Nevada Sagebrush Ecosystem Council.

Restoration would be based on data-driven models that incorporate ecological site potential and identify the highest priority sites with high success potential. Vegetation management would be similar to that under Alternatives B and D. Coordination processes between the state and land management agencies ensure consistency in all vegetation management actions, as well as establishment, monitoring, and implementation of no net loss mitigation.

Management under Alternative E would provide for more vegetation treatments within occupied GRSG habitat than Alternative A. It is similar to Alternatives B and D.

Ten and fifty year habitat trends would improve compared to Alternative A and would be similar to Alternatives B and D.

Impacts from Livestock Grazing Management

Under Alternative E, GRSG management would be focused on SGMAs encompassing four categories, Occupied, Suitable, Potential, and Non-Habitat areas. There would be no change in acres from existing areas open to grazing. Management under Alternative E would emphasize cooperative implementation of appropriate prescribed grazing conservation actions, such as NRCS conservation Practice Standard 528 for prescribed grazing, at scales sufficient to influence a positive response in occupied and suitable GRSG habitat acres (NRCS 2011). Occupied and

suitable habitat would be managed to retain attributes necessary for GRSG. Potential habitats would be managed for habitat enhancement and restoration to expand or restore occupied and suitable habitats. Overall, impacts on GRSG and their habitats from implementation of Alternative E would be similar to Alternatives B and D, but would be applied to SGMAs, which are smaller in extent than PPMAs and PGMAs in Alternatives B and D. Enhancement of potential habitats under Alternative E may improve GRSG habitats that are currently unoccupied. The impact of improvements within unoccupied habitats is difficult to characterize but has the potential to provide additional habitat for GRSG.

Uplands would be managed by ensuring that existing grazing permits maintain or enhance SGMAs. Livestock grazing would be used as a tool, when appropriate, to improve GRSG habitat quantity, quality or to reduce wildfire threats. Land management agencies would be encouraged to cooperatively make timely, seasonal range management decisions with livestock operators to respond to vegetation management objectives, including fuels reduction based on the flexibility of livestock operators.

Riparian areas would be managed, at a minimum, for PFC. BLM riparian areas would be managed to meet RAC standards. Alternative E would promote riparian grazing improvements along with additional infrastructure (e.g., fences and troughs) in order to control season, duration and degree of use to promote herbage removal at acceptable limits. These improvements would be beneficial to late summer brood-rearing habitat for GRSG.

Impacts from Fire and Fuels Management

Under Alternative E, the effects on GRSG from wildfire suppression and fuels management would be similar to the effects described under Alternative D. With respect to hazardous fuels treatments, this alternative sets a goal of supporting incentives for developing a beneficial use for biomass. Additionally, it seeks to expedite the process to implement fuels reduction projects for protection of GRSG habitat. Finally, it seeks to improve pre-suppression, initial attack, and suppression efforts and to reduce the number of fires greater than 300 acres. These activities would decrease the likelihood for large fires in GRSG habitats. However, relative to the amount of GRSG habitat that would continue to burn outside the control of the BLM or Forest Service, these actions may provide localized but minimal protections and improvements to GRSG habitat.

Impacts from Wild Horse and Burro Management

Similar to Alternatives B and D.

Impacts from Leasable Minerals Management

Management under Alternative E would allow leasing within SGMAs on all lands with federal fluid mineral estate. The State policy of avoid, minimize, and mitigate would include NSO stipulations and a 5 percent surface-disturbance cap. Existing mineral withdrawals would include 1,399,700 acres, and 11,708,400 acres open to leasing would be subject to the "avoid, minimize, and mitigate" policy.

For nonenergy leasables, management under Alternative E would implement an avoidance strategy on 15,905,600 acres within SGMAs including 11,708,400 acres of occupied and suitable habitat. Within modeled nesting habitat, SGMAs include 11,960,500 acres of occupied and suitable habitat combined. Existing withdrawn acreage, avoidance, and implementation of the avoid, minimize, and mitigate policy would provide an increased level of protection to all acres of

occupied and suitable habitat within modeled nesting habitat associated with leks representing 91 percent of the GRSG population for the sub-region, and by sub-population below (**Table 4-25**, Alternative E: Percent of GRSG Sub-Populations Affected by NSO Stipulations for Leasing).

Impacts from Locatable Minerals Management

Lands would be generally open to mineral location. There are specific existing locatable mineral withdrawals for particular ROWs, designated wilderness areas, ACECs, and other administrative needs, but none specific to protecting GRSG habitat. All locatable mineral activities are managed under the Surface Management Regulations at 43 CFR 3809. Mitigation of effects on GRSG and its habitat are identified through the NEPA process approving plans of operation. Goals and objectives for locatable minerals are to avoid, minimize and mitigate while providing opportunities to legally access locatable mineral resources.

Table 4.26. Alternative E: Percent of GRSG Sub-Populations Affected by Avoidance for Fluid Minerals

Sub-Population	Percent
Central Nevada	98
Southeast Nevada	95
Northwest Interior	0
Quinn Range	0
North-central Nevada	100
Northeast Nevada	98
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	84
Warm Springs Valley	92
Source: BLM and Forest Service 2013	

Of state-designated Occupied and Suitable habitat within SGMAs, 1,399,700 acres would be withdrawn as under current management and 11,708,400 acres would be open to locatable minerals. Effects on GRSG populations are similar to Alternative A (see **Table 4-4**, Alternative A: Percent of GRSG Sub-Populations Affected by Withdrawal).

Impacts from Salable Minerals Management

Management under Alternative E would avoid mineral material sales within SGMAs and apply a policy of avoid, minimize, and mitigate. This alternative would limit habitat disturbance to 5 percent per year, per 640 acres, unless habitat treatments show credible positive results, and would refer disturbance levels exceeding 5 percent per 640 acres to evaluation and consultation with the Nevada Sagebrush Ecosystem Technical Team. SGMAs apply only to lands within Nevada.

Management under Alternative E would implement the avoidance strategy on 15,905,600 acres within SGMAs, including 11,708,400 acres of occupied and suitable habitat combined. Existing withdrawn acreage, avoidance, and implementation of the avoid, minimize, and mitigate policy would provide an increased level of protection to all acres of occupied and suitable habitat within modeled nesting habitat associated with leks representing 91 percent of the GRSG population for the sub-region, and by sub-population below (**Table 4-26**, Alternative E: Percent of GRSG Sub-Populations Affected by Closure to Salables).

Table 4.27. Alternative E: Percent of GRSG Sub-Populations Affected by Avoidance to Salables

Sub-Population	Percent
Central Nevada	98
Southeast Nevada	95
Northwest Interior	0
Quinn Range	0
North-central Nevada	100
Northeast Nevada	98
South-central Oregon/ North-central Nevada	100
Northeast California/ Northwest Nevada	84
Warm Springs Valley	92
Source: BLM and Forest Service 2013	

Impacts from Land Uses and Realty Management

Under Alternative E, habitat disturbance would be limited to 5 percent per year per 640 acres, unless habitat treatments show credible positive results, and would refer disturbance levels exceeding 5 percent per 640 acres to evaluation and consultation with the Nevada Sagebrush Ecosystem Technical Team. SGMAs apply only to lands within Nevada. On federal lands in Nevada with already pre-approved activities, no new mitigation would take place beyond previously approved in Plans of Development, ROWs, or drilling plans. General guidance would be to avoid when possible, minimize adverse effects as practicable, and mitigate adverse effects in Occupied or Suitable Habitat in Nevada. Whenever possible, this alternative would locate facilities in non-habitat areas, site new linear features in existing corridors or co-locate them with other existing features and engage in reclamation and weed control efforts. Management under Alternative E would emphasize fire prevention, reclamation, invasive weed control, and predator control to benefit GRSG. This alternative would provide few regulatory mechanisms to reduce direct or indirect impacts on GRSG and their habitat compared with Alternative A.

Impacts from Renewable Energy Management

Under Alternative E, management strategy would be to avoid conflicts with GRSG habitat by siting projects outside of habitat wherever possible. Because this strategy would not rule out the construction of projects within or adjacent to GRSG habitat, there would be the possibility for more land use for both wind and solar energy development than under Alternative A, but it is not quantifiable.

Impacts from Wind Energy Development

Same as Alternatives B and C.

Impacts from Solar Energy Development

Same as Alternative B.

Impacts from Comprehensive Travel and Transportation Management

Same as Alternative D.

4.3.9. Alternative F

Impacts from Vegetation and Soils Management

Under Alternative F, BLM-administered lands in California would continue to be managed under Alternative A. For federal lands in Nevada, management under Alternative F generally would repeat management actions described under Alternative B with exceptions such as reduced treatment of invasive conifer.

Management under Alternative F would provide about the same level of protection as Alternative B or slightly less. VDDT modeling projects that habitat trends for 10 and 50 years would improve compared with Alternative A and would be similar to Alternative B.

Impacts from Livestock Grazing Management

Management under Alternative F would retain the same number of acres open and the same number of acres closed to livestock grazing as found under Alternative A and, therefore, would affect the same percentage of the sub-regions GRSG population. All prescriptions related to livestock management would apply to all GRSG habitats. Management under Alternative F would be more restrictive than Alternative A, resting 25 percent of each GRSG planning area annually, keeping utilization levels at or below 25 percent on all habitats, and restricting the use of new water developments using spring or seep sources from within GRSG habitat. Management under Alternative F would also require that water developments be analyzed and if necessary modified or removed if they are found to be impacting a riparian area. Similar modification or removal standards would be applied to other existing range developments such as fences. No salt or other supplements would be allowed. Ensuring riparian areas are at PFC would be the same as for Alternative A. Compared with Alternative A, management under Alternative F would provide more indirect benefits to GRSG due to increases in both upland and riparian nesting and brood-rearing habitat amount and quality. Management under Alternative F would increase some direct impacts on nesting GRSG when compared with Alternative A by not applying timing restrictions to livestock during GRSG nesting periods. This would likely be offset by closure of 25 percent of each planning area to livestock grazing each year and removal of certain livestock related structures such as fences.

Impacts from Fire and Fuels Management

Same as Alternative B.

Impacts from Wild Horse and Burro Management

Under Alternative F, AML for wild horses and burros would be reduced by 25 percent in all HMAs and WHTs in GRSG habitat. All other management would be the same as under Alternative B. In comparing horse-removed sites to horse-occupied sites, researchers have documented reduced total vegetative and grass abundance and cover, lower sagebrush canopy cover, increased fragmentation of shrub canopies, lower species richness, increased compaction in surface soil horizons, and increased dominance of unpalatable forbs (Manier et al. 2013).

Horses typically separate from cattle by using higher elevations and steeper slopes where the 25 percent reduction would be most pronounced (Connelly et al. 2004). A 25 percent reduction in AML in GRSG habitat would improve upland sites and water sources with which horses tend to associate. These sites correspond with early and late GRSG brood-rearing habitats. HMA

plans, when developed or updated, would incorporate GRSG habitat objectives. Implementation of any range improvements would follow the same guidance as identified for livestock grazing under this alternative. This includes designing and locating new improvements only where they “conserve, enhance, or restore GRSG habitat through improved grazing management.” Design features could include developing or modifying waters to mitigate for West Nile virus, removing or modifying fences to reduce the chance of bird strikes, and monitoring and treating invasive species associated with range improvements. Additional range improvements would specifically address the needs of GRSG.

Impacts from Leasable Minerals Management

Management under Alternative F would close PPMAs and PGMAs to fluid mineral leasing. Quantification is the same as in Salable Mineral Materials, Alternative C.

Impacts from Locatable and Salable Minerals Management

Impacts from locatable minerals management would be the same as for Alternative B.

Impacts from salable minerals management would be the same as for Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative F, all PGMAs would be managed as avoidance areas for new ROWs and all PPMAs habitats would be managed as ROW/SUA exclusion for new permits with exceptions for co-location of projects within existing footprints and valid, existing rights. ROW/SUA avoidance acreage would impact about the same amount of modeled sub-regional GRSG population as Alternative A, about 3 percent. Under this alternative, 17,732,200 acres would be managed as ROW/SUA exclusion. ROW/SUA exclusion would protect about 17,100,00 more acres of PPMAs habitat than under Alternative A. Management under Alternative F would also include actions to reclaim or modify existing ROWs that may impact GRSG directly (fences) or indirectly benefit their habitat (e.g., restoring a non-used road). Management under Alternative F would retain public ownership of PPMAs where it benefitted overall GRSG habitat and propose priority habitat for mineral withdrawal. Management under Alternative F would be expected to provide greater direct protections to GRSG than Alternative A due to the larger number of acres under Alternative F being in the ROW/SUA exclusion category. Indirect impacts on habitat would be expected to also be less than Alternative A.

Impacts from Renewable Energy Management

Under Alternative F, wind energy projects would not be sited within occupied GRSG habitat (PPMAs and PGMAs), within 4 miles of the perimeter of GRSG winter habitat, or within five miles of an active lek. This would result in 17,732,900 acres managed as ROW/SUA exclusion for wind energy development.

Under this alternative, solar development would be the same as Alternative A, and the same nature and scope of impacts would be expected.

Impacts from Wind Energy Development

Same as Alternative D.

Impacts from Solar Energy Development

Same as Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Impacts would be similar to those described for Alternative B. Alternative F also specifies a prohibition on camping within 4 miles of leks, which is the only recreation-specific management action outside travel management in any of the action alternatives. Camping does not typically occur during the lekking season between March 1 and May 15 due to weather and ground conditions. Camping within 4 miles of a lek location during other seasons would not disturb GRSG or their habitat as the birds disperse to nesting locations, and later into brooding and winter habitats. With respect to travel management, impacts from Alternative F would not differ appreciably from Alternative B.

4.4. Vegetation and Soils

4.4.1. Methods and Assumptions

Indicators

Indicators of impacts on vegetation are as follows:

Upland Vegetation

- Acres and condition of native vegetation communities; and
- Change in the estimated acres of conifer encroachment

Noxious Weeds and Invasive Species

- Change in the likelihood for noxious weed or invasive annual grass introduction or spread
- Change in the amount or density of noxious weed or invasive annual grasses

Note that impacts on riparian and wetland vegetation are discussed in **Section 4.5, Riparian Areas and Wetlands**

Assumptions

The analysis includes the following assumptions:

- 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.
- New invasions of noxious and invasive weeds would continue to occur and spread as a result 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.
- Since the effects of climate change are complex and not yet well known or understood, the analysis was conducted assuming hotter, dryer conditions, leading to plant stress. Plant adaptations to climate stress are not known.

- Ecological health and ecosystem functioning depend on a number of factors, including vegetative cover, species diversity, nutrient cycling and availability, water infiltration and availability, percent cover of weeds and climatic trends.

Short-term effects on upland vegetation would occur over a timeframe of up to ten years and long-term effects would occur over longer than ten years.

4.4.2. Nature and Type of Effects

Vegetation

Management actions could affect vegetation resources by changing species composition, distribution, density and condition. Vegetation communities could change from one state to another state through transitions commonly referred to as state-and-transition models (Bestelmeyer et al. 2003). Management actions could improve, maintain, or decrease GRSG habitat. GRSG depend on the vegetation resources for cover and feed, primarily sagebrush species. Natural change agents could also alter the vegetation communities through wildfires and drought conditions. Drought conditions can alter plant vigor and seed production.

Historically, sagebrush-dominated vegetation was one of the most widespread habitats in the country, but its expanse has been fragmented, lost, or altered by invasive plants and anthropogenic disturbance (NTT 2011). Protection of GRSG habitat would involve restrictions and limitations on activities that contribute to the spread of invasive species, fire, and other surface disturbance, and management of vegetation to promote healthy sagebrush and understory vegetation to support GRSG. Management of vegetation resources to protect GRSG would alter vegetative communities by promoting increases in sagebrush height and herbaceous cover and vegetation productivity, in order to improve rangeland health and enhance sagebrush ecosystems. Treatments designed to prevent encroachment of shrubs, non-native species or woody vegetation would alter the condition of native vegetation communities by changing the density, composition, and frequency of species within plant communities (Connelly et al. 2004).

Invasive Weeds

Management actions could reduce invasive weed populations through control methods such as chemical, biological, mechanical, and manual removal. Management actions could also increase invasive species and help weed populations be established by disturbance factors such as road construction, fence construction, vegetation removal, vehicle traffic, wildlife, and livestock grazing and movement. Vegetation treatments would cause short-term disturbance to vegetation from vegetation removal, but would result in long-term improvements to habitat quality and rangeland health.

Soils

Management actions could affect soil resources by removing soils due to mechanized equipment, vehicle traffic and natural means. Erosion of soils could be experienced by wind or water (overland runoff). Vegetation removal or the presence of invasive annual vegetation could likely cause increased soil erosion.

Habitat Restoration

Habitat restoration projects typically have multiple objectives: increasing forage and cover for wildlife, reducing nonnative or weedy species, reducing pinyon/juniper encroachment, reducing canopy coverage of woody species, replenishing seed banks, and creating a mosaic of vegetative age classes. While these projects typically result in short-term vegetation removal, much like fuels projects, they are typically designed to improve habitat and result in a more diverse, vigorous, healthy plant community.

Emergency Stabilization and Rehabilitation in burned areas is part of a holistic approach to addressing post-wildfire issues and also includes suppression activity damage repair and long-term restoration (more than three years). ESR is planned actions performed by burned area emergency response teams within one year of wildfire containment to stabilize and prevent unacceptable degradation of natural and cultural resources, to minimize threats to life or property from the impacts of a fire, or to repair, replace, or construct physical improvements to prevent degradation of land or resources. Burned area rehabilitation is undertaken within three years of wildfire containment to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire (DOI 2006). Following a wildfire, ESR stabilizes and prevents unacceptable degradation of natural and cultural resources. Post-wildfire ESR assists in stabilizing soils, replenishing the seed bank, and addressing weed threats. These activities are typically designed to restore the vegetative cover and to assist post-fire recovery. Post wildfire cheatgrass conversion is one of the biggest challenges across the planning area. If successful, ESR will reduce erosion, aid in reducing cheatgrass invasion, and maintain appropriate fire return intervals. ESR benefits both upland and riparian vegetative communities.

Fire and Fuels Management

In most of the planning area, fuel conditions have changed from historic conditions because of management practices and the spread of nonnative species. Fire exclusion, in the form of fire suppression, has greatly affected fuel conditions. In pinyon/juniper systems, this management practice results in increased fuel loadings because fires are more infrequent than historic fire-return intervals. Sagebrush within this habitat is also transitioning to an older age class that is more decadent; with high fuels loading that can support large severe wildfires. These increased fuel loadings are leading to higher severity fires that require more post-fire rehabilitation. The main structural change in what were historically sagebrush shrublands is the encroachment of pinyon and juniper, other conifers, and other woody shrubs into the sagebrush. Over time the encroachment will increase the fuels loading, causing an upward shift in fire behavior. This increases the resistance to control, decreasing the effectiveness of firefighting efforts. Fuels management has both short- and long-term impacts on vegetation. In the short term, vegetation will be lost, but in the long term, fuels management would improve vegetative health, composition, and productivity. Additionally, in the long term, fuels treatments would prevent uncharacteristically large or intense wildfires that could damage large expanses of vegetation. If fuels treatments are unsuccessful, habitat may be converted to exotic annuals and other weedy species. Assuming all fuels projects would be designed and managed to meet Land Health Standards, negative impacts on uplands and riparian areas would not be anticipated. Since the Forest Service does not have an equivalent to Land Health Standards, fuels projects would be designed to meet GRSG habitat objectives (see Table 2-6).

Fire management practices include the control of wildfires in some areas, the use of fire either through prescribed burning or the management of wildfires in order to meet land management goals, and the treatment of vegetation so that fires are more controllable in areas where values

at risk are higher. Wildland fire management on BLM-administered lands is guided by a fire management plan that considers the three elements mentioned above, as well as firefighter and public safety and cost effectiveness. Fire is an inherent component of ecosystems and historically has had an important role in promoting plant succession and the development of plant community characteristics. Control of fires and other land use practices during the last century has changed plant communities by altering the frequency, size, and severity of wildfires. Indicators of wildland fire ecology and management is summarized through fire regime and condition class classifications.

Fire regimes are used as part of the FRCC discussion to describe fire frequency (average number of years between fires) and fire severity (effect of the fire on the dominant overstory vegetation - low, mixed, or stand replacement). These regimes represent fire intervals prior to Euro-American settlement and are calculated and classified by analyzing natural vegetation, known fire cycles, and fire history data. Condition class indicates the degree of departure from the historic fire regime (Hann and Bunnell 2001; see **Table 3-23**, Condition Classes in PPH and PGH [acres]). While the fire regime of a particular area is not likely to change except in the very long term, the condition class can be changed through fire management and other vegetation management actions. Extreme departure from the historic fire regime results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought). Depending on size, location, severity, intensity, and vegetation, wildfire would have short-term impacts on vegetation, resulting in vegetation removal and soil disturbance from suppression actions. Fire can also lead to the proliferation of cheatgrass in lower precipitation zones and subsequent habitat degradation. In the long term, wildfire can be beneficial, resulting in a mixed serial stage, greater vegetative diversity, and habitat restoration.

4.4.3. Impacts Common to All Alternatives

Vegetation

Livestock grazing can affect soils, vegetation health, species composition, water, and nutrient availability by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems (Connelly et al. 2004; NTT 2011). Grazing may reduce herbaceous understory cover for nesting GRSB, but also may enhance rangeland health by limiting the growth of introduced annual plants.

Changes in livestock management could affect vegetation by reducing grazing pressure on forage species where livestock numbers are reduced, or duration of grazing period is reduced, or if the season of use is during dormancy. Changes in livestock management could affect vegetation by increasing grazing pressure on forage species if livestock numbers are increased, or duration of grazing period is increased, or if the season of use is during hot season.

Invasive Weeds

Livestock grazing is one of the vectors to introduce and or increase the spread of invasive weeds. Multiple factors can influence an area's susceptibility to cheatgrass invasion, including livestock grazing, perennial grass cover and biological soil crusts (Reisner et al. 2013).

Impacts from Fire and Fuels Management

Big sagebrush does not re-sprout after a fire, but is replenished by wind dispersed seed from adjacent unburned stands or seeds in the soil. Depending on the species and the size of a burn, sagebrush can reestablish within five years of a burn, but a return to a full pre-burn community cover can take 13 to 100 years (Connelly et al. 2004). Fire suppression may be used to maintain habitat for GRSG (NTT 2011), but these policies alter the successional pattern of vegetation in the landscape. When management reduces wildland fire frequency by controlling natural ignitions, the indirect impact is that vegetation ages, and early successional vegetation communities are diminished. Fire suppression may preserve condition of some sagebrush communities, as well as habitat connectivity. This is particularly important in areas where fire frequency has increased as a result of weed invasion, or where landscapes are highly fragmented. However, fire suppression can also lead to increased fuel loads, which can lead to more damaging or larger-scale fires in the long term. Selective siting of fuels management treatments may allow for fire suppression actions to use suppression tactics protect sagebrush communities from wildfires.

Impacts from Wild Horse and Burro Management

Among all six alternatives, the number of acres of vegetation affected would be the same. Impacts from wild horse and burro populations and management to vegetation resources would be the same as identified in the individual Resource Management Plan NEPA analysis.

4.4.4. Alternative A

Impacts from Greater Sage-Grouse Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Riparian and Water Resources Management would continue to operate as guided by individual LUPs. Continued construction of water developments on BLM-administered lands would be implemented in accordance with Land Health Assessments that would lead to an improvement in vegetation conditions through proper grazing management. Under this alternative PPMAs and PGMAs prioritization do not apply, therefore management would not be focused on these areas leading to less acres of riparian and water resources management within priority habitat. This alternative therefore would have less acreage impacted by short-term impacts through the construction of water developments to vegetation, and more acres of long-term impacts on vegetation without water developments installed to achieve proper grazing management within priority habitat.

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Vegetation and Soils Management

Under Alternative A, PPMAs and PGMAs restrictions do not apply. Post fire rehabilitation, invasive species management, and restoration activities would be guided by individual field office's fire management plans and LUPs. Integrated Vegetation Management Handbook policies would be followed and would provide guidance on which treatments and chemicals can be used. Application of these policies would improve vegetation management in sagebrush habitat thereby likely improving vegetation and soils conditions in these areas. A greater amount of sagebrush acreage within PPMAs and PGMAs areas may be burned under this alternative and thus requiring additional post fire rehabilitation and invasive species management.

Impacts from Livestock Grazing Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Fire and Fuels Management

Wildfire Management

Fire suppression would be guided by individual field office's fire management plans, or LUPs. A greater acreage of sagebrush may be burned within priority habitat under Alternative A since it is the least restrictive on wildland fire management within PPMAs and PGMAs areas. As a result, a greater loss of vegetation could occur in sagebrush habitats under Alternative A. This could result in an increased risk of annual grass and noxious weeds invasion due to the disturbance.

Fuels reductions projects would also be guided by the individual field office's fire management plans or LUPs. Fewer fuels projects would occur in or around priority habitat under Alternative A since it is the least restrictive. With fewer fuels projects designed to protect PPMAs, this could lead to greater acreage of sagebrush that may be burned within priority habitat. Also under Alternative A, PPMAs and PGMA's restrictions do not apply. Fuels projects could be implemented without disturbance limits. Project design would be limited by NEPA compliance. Habitat improvement and restoration projects would be implemented for livestock, wildlife, and fuels reduction. Since Alternative A would have the fewest restrictions for fuels treatments, the greatest number of acres would be available for treatment. While Alternative A may result in the largest amount of short-term vegetation loss, long-term impacts include increases in vegetation composition and health.

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Wild Horse and Burro Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Climate Change Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the current LUPs regarding climate change management.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the current LUPs regarding climate change management.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the current LUPs regarding climate change management.

Impacts from Leasable Minerals Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Locatable and Salable Minerals Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Land Uses and Realty Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Renewable Energy Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Comprehensive Travel and Transportation Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

Impacts from Recreation Management

Vegetation

Under Alternative A, the impacts on vegetation resources would continue to be the same as those identified in the individual LUP documents.

Invasive Weeds

Under Alternative A, the impacts on invasive weeds would continue to be the same as those identified in the individual LUP documents.

Soils

Under Alternative A, the impacts on soils would continue to be the same as those identified in the individual LUP documents.

4.4.5. Alternative B

Impacts from Greater Sage-Grouse Management

Under Alternative B, large scale disturbances within priority habitat would not be permitted and small scale disturbances would be limited to 3 percent surface disturbance. This would minimize disturbance to vegetation and soils. Although lands may be limited to a disturbance threshold, there may not be a resultant change in vegetation or soil conditions.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Riparian and Water Resources management actions under Alternative B would allow new water developments only to occur if GRSG PPMAs would benefit. Most water developments are implemented in association with livestock grazing management, with focus on alleviating or excluding riparian areas from use in order to obtain PFC, thereby benefiting GRSG habitat. Direct short-term impacts include ground disturbing activities during the construction of the developments which includes trenching and clearing of soil to install pipelines and associated trough(s), and disturbances associated with fence construction. Therefore the amount of short-term impacts due to new water developments would be the same as Alternative A, as most spring developments are associated with improved grazing management with the goal of improving vegetation conditions. These types of projects also indirectly benefit upland vegetation through improved livestock distribution. This alternative also includes making necessary modifications to existing developments within PPMAs to maintain the continuity of the predevelopment riparian area. This would increase the amount of acres of short-term impacts on vegetation to make necessary modifications when compared with Alternative A. However, this would also indirectly increase the amount of acres of vegetation improvement in the long term through the proper maintenance of the development; with the assumption grazing management is meeting or making progress towards Land Health Standards.

Under Alternative B, riparian areas would be managed for PFC. Both vegetation and soils are assessed to determine if a system is at PFC or pertinent Forest Plan standards and guidelines. Vegetation and soils would likely be resilient to withstand 25 year flood events when at PFC. Diversity of riparian vegetation could be increased if managed to the potential natural community. Under this alternative, new water developments would be constructed only if they are beneficial to priority habitat. This may minimize surface disturbance to soils and vegetation in riparian areas.

Impacts from Vegetation and Soils Management

Habitat restoration and vegetation management actions under Alternative B would aim to improve vegetation conditions and prioritize restoration efforts to benefit sagebrush vegetation. As a result, the restoration and vegetation management actions would enhance vegetation beyond the extent and condition relative to Alternative A by requiring the use of native seeds, removing encroaching conifers, designing post-restoration management to ensure the long-term persistence of the restoration efforts, considering changes in climate, and monitoring and controlling invasive species. In PPMAs and PGMAs, fires would be suppressed to conserve habitat. Fewer acres of sagebrush habitat would be converted to an early seral stage than under Alternative A, thus fewer acres may require ESR treatments and invasive species control. The emphasis on native seed and reestablishment of species-appropriate sagebrush seed would improve vegetation conditions. In the absence of fire or fuels treatments, this alternative may result in more decadent sagebrush stands with depleted understories in the future. This could lead to increased risk of catastrophic

fire as a result of fire suppression or exclusion and indirectly lead to larger ESR treatments and invasive weed control projects in the long term.

Impacts from Livestock Grazing Management

Under Alternative B, grazing management to achieve vegetation composition and structure consistent with ecological site potential could maintain or enhance sagebrush and perennial grass conditions within priority habitat. Impacts on soils from livestock grazing management are likely to be the same as those identified under Alternative A.

Impacts from Fire and Fuels Management

Wildfire Management

Fire in PPMAs and adjacent PGMAs would be suppressed to conserve habitat. Fewer acres of sagebrush habitat would be converted to an early seral stage than under Alternative A. However, there could also be a greater potential for catastrophic fire as a result of fire suppression and exclusion. As a result of actions, more fires would be suppressed in the surrounding vegetative communities to protect sagebrush, and fewer acres of sagebrush habitat would be lost to fire. However, increased fire suppression could also contribute to larger catastrophic fires in the future due to increases in fuel loading in PPMAs and adjacent PGMAs. With suppression efforts focused on PPMAs and adjacent PGMAs more acres would likely burn in areas outside of PPMAs. This could lead to catastrophic fires converting sagebrush habitats to early seral stage in PGMAs areas, or to annual grasslands in low elevations not considered GRSG habitat. Large portions of PGMAs habitat are areas that have been impacted by fire over the last decade and still have the potential to become PPMAs as succession progresses. These communities can be negatively impacted and may cross a threshold if they are burned again. Changes in soil, vegetation, and water properties would be more likely to occur outside of PPMAs under this alternative.

Fuels Management

Fuels projects could not reduce sagebrush canopy cover below 15 percent, with the exception of fuels breaks. In PPMAs, seasonal restrictions would apply to fuels treatments, and prescribed fire would be excluded in sagebrush habitat where there is less than 12 inches of annual precipitation.

Treatments would be to rest areas from livestock grazing for two full growing seasons. Fuels treatments would use native plant seeds, with exceptions for availability and probability of success when nonnative seeds would meet GRSG objectives. Restrictions under Alternative B would reduce the opportunity for fuels treatments and limit treatment objectives, which would lead to fewer acres treated. Under this alternative, treatments would be limited to those that benefit GRSG or the identified GRSG objectives. Restrictions would also limit the number of acres treated and potentially the effectiveness of the treatments. Overall fewer acres would be treated under Alternative B than Alternative A.

Impacts from Wild Horse and Burro Management

Vegetation

Under Alternative B, vegetation in HMAs/WHBTs would be managed to achieve GRSG habitat objectives. This could allow for improvement of sagebrush/perennial grass communities in those HMAs/WHBTs.

Invasive Weeds

Under Alternative B, impacts on invasive weeds would be the same as those analyzed under Alternative A.

Soils

Under Alternative B, soils in HMAs/WHBTs would be managed to achieve GRSG habitat objectives. This could allow for improvement of soils conditions in those HMAs/WHBTs.

Impacts from Climate Change Management

Under Alternative B, potential improvements to sagebrush/perennial grass communities, soil health and functions would also improve creating greater resiliency to the predicted effects of climate change.

Impacts from Leasable Minerals Management

Under Alternative B, no new surface occupancy would be authorized. This could reduce vegetation and soils disturbance. Where applications for permits to drill are authorized for existing leases, surface disturbance would be limited to 3 percent. This would minimize disturbance to vegetation and soils. Although lands may be listed as closed, there may not be a resultant change in vegetation or soil conditions.

Impacts from Locatable and Salable Minerals Management

Under Alternative B, no closures of PPMAs would be authorized. This could reduce vegetation and soils disturbance. This would minimize disturbance to vegetation and soils. Although lands may be listed as withdrawn and/or closed, there may not be a resultant change in vegetation or soil conditions.

Impacts from Land Uses and Realty Management

Under Alternative B, new ROW actions would be restricted to the footprint of existing ROWs. This would keep any new disturbance to vegetation or soils to previously disturbed locations. This Alternative involves burial of new or existing power lines where feasible and this could increase the disturbance of vegetation and soils in new locations. Under Alternative B, disturbance to sagebrush would be limited to 3 percent surface disturbance. This could maintain sagebrush/perennial grass vegetation communities within the priority habitat in the planning area. Vegetation conditions could increase where other developments, such as fences and roads would be reclaimed if they are no longer in use.

Impacts from Renewable Energy Management

Under Alternative B, vegetation and soils disturbance from energy development would be minimized in priority habitat containing sagebrush/perennial grass vegetation communities. Although lands may be listed as excluded from energy development, there may not be a resultant change in vegetation or soil conditions. Under Alternative B, disturbance to sagebrush would be limited to 3 percent surface disturbance. This could maintain sagebrush/perennial grass vegetation communities within the priority habitat in the planning area.

Impacts from Comprehensive Travel and Transportation Management

Limiting motorized travel to designated roads, primitive roads and trails under Alternative B would minimize disturbance of vegetation and soils from vehicle traffic within the planning area. Limiting or prohibiting construction of new roads would minimize disturbance to vegetation and soils in priority habitat. Mitigation measures could increase the sagebrush/perennial grass community type if disturbance exceeds the 3 percent threshold.

Impacts from Recreation Management

Under Alternative B, only SRPs that have neutral or beneficial impacts on priority habitat would be authorized. This could limit the disturbance to vegetation and soils within priority habitat.

4.4.6. Alternative C

Impacts from Greater Sage-Grouse Management

Under Alternative C, passive restoration would occur. Passive restoration methods may not allow for conversion to a different vegetation community, as described in state-and-transition models. This applies to those vegetation communities that have passed a threshold, or transition, away from a reference or desired state. Unlike community pathways, transitions are not reversible by simply altering the intensity or direction of the factors that produced the change and instead require the application of distinct factors such as the addition of seeds, the removal of shrubs, or the addition of top soil (Bestelmeyer et al. 2003).

Impacts from Riparian Areas, Wetlands and Water Resources Management

Under Alternative C, bank trampling in riparian areas would be limited to 10 percent of livestock accessible stream and spring margin and meadow areas. This could allow for soils along riparian areas to experience minimized disturbance from livestock. Riparian area soils could maintain hydric conditions.

Impacts from Vegetation and Soils Management

This alternative focuses on the restoration of crested wheatgrass seedings and cheatgrass infestation areas. It does not prioritize any other treatments within PPMAs. It would also prioritize the use of flash burners, mowing, and selected hand cutting for weed treatments, with herbicide only being used if there is no other alternative.

This alternative relies more on passive restoration and would lead to fewer acres of vegetation management being treated compared with Alternative A. However, it is likely that more acres of crested wheatgrass seedings and cheatgrass invaded areas would be treated improving vegetative conditions for GRSG habitat with success in those areas. With minimizing the use of herbicides to treat annual grasses and noxious weeds fewer acres of acres of treatment would be completed under this alternative compared with Alternative A. Active seeding of those areas of intensive disturbance could result in short-term disturbance of vegetation and soils until establishment of perennial vegetation is obtained. The use of flash burning, mowing and other mechanical methods could show a temporary disturbance in vegetation and soils.

Impacts from Livestock Grazing Management

Vegetation

Under Alternative C, livestock grazing would not be permitted within occupied GRS habitat. As a result, fine fuels could increase throughout occupied habitat and fire risk may increase as well. Depending on the vegetation conditions and community types prior to removal of livestock, this could result in higher fine fuel loading or a closed shrub canopy.

Invasive Species

Under Alternative C, large scale removal of livestock could reduce one of the vectors of invasive weed establishment and spread. Removal of fences, water troughs, and pipelines within PPMAs could temporarily increase the disturbance of vegetation and soils, possibly leading to an increased invasive weed establishment and spread.

Under Alternative C, all PPMAs areas closed to livestock grazing could show a reduction in the potential for invasive species establishment. This may not control or reduce the existing invasive species presence. The dominance of cheatgrass and medusahead in the intermountain West, partly caused by extensive overgrazing in the late 1800s and early 1900s, would not be rectified by removing cattle or by reducing their numbers. The new cheatgrass-dominated “steady state” would require the use of treatments such as herbicides, seeding, and fertilizing to restore the pre-settlement flora (Sheley and Petroff 1999).

Soils

Trampling impacts on soils could be minimized by large scale removal of livestock grazing under Alternative C. Reduced trampling could result in reduced impacts on biological soil crusts.

Impacts from Fire and Fuels Management

The type of impacts from wildland fire management would be the same as those described under Alternative A.

Fuels treatments would focus on areas of human habitation or in areas of significant existing disturbances. This alternative would have more restrictions and result in fewer acres treated when compared with Alternative A. Under these restrictions fuels treatments would only allow the removal of grass along roadsides or other disturbed areas, and would not include the removal of shrubs. This would restrict the amount of acres that could be treated in PPMAs areas.

Impacts from Wild Horse and Burro Management

Under Alternative C, impacts on vegetation and soils would be the same as Alternative A.

Impacts from Climate Change Management

Under Alternative C, impacts on vegetation and soils would be the same as Alternative A.

Impacts from Leasable Minerals Management

In closed areas, there would be little to no impact on soils and vegetation.

Impacts from Locatable and Salable Minerals Management

Disturbance of vegetation and soils due to development of locatable and salable minerals management could be minimized in occupied habitat under Alternative C. Disturbance to vegetation would be the same as Alternative A in non-occupied habitat.

Impacts from Land Uses and Realty Management

Under Alternative C, additional lands would be acquired to be managed by federal land management agencies. The impacts on vegetation and soils would be the same as those identified under Alternative A where lands are designated as ACECs.

Impacts from Renewable Energy Management

Under Alternative C, solar energy development would not occur within the proposed ACEC, and could minimize vegetation and soils disturbance, although much of the planning area is not of high potential for solar energy development. The buffer distances of 10 to 15 miles between ACECs, occupied habitat and wind energy development could minimize vegetation and soils disturbance due to the construction and maintenance of those facilities in the buffered areas.

Impacts from Comprehensive Travel and Transportation Management

Closing of all lands to cross country travel under Alternative C would minimize disturbance of vegetation and soils from vehicle traffic within the planning area.

Impacts from Recreation Management

Under Alternative C, impacts on vegetation and soils would be the same as Alternative A.

4.4.7. Alternative D

Impacts from Greater Sage-Grouse Management

Under Alternative D, lands would be managed to meet GRSG and habitat objectives. Sagebrush/perennial grass ecosystems would be enhanced or maintained. This would directly or indirectly increase sagebrush vegetation. Conifer stands in historic sagebrush areas would be reduced.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Impacts on riparian areas would similar to Alternative B, although under this alternative, riparian areas and wetlands would receive more emphasis in the development of management actions for weed control, vegetation treatments, fuels management and water developments. As with Alternative B, riparian habitats would be managed for some level of desired ecological condition. Habitat objectives for riparian areas would also be incorporated into the permitting process for livestock grazing. Collectively, these measures would have the effect of improving overall watershed health with more positive effects on vegetation and soils resources compared with Alternative A.

Riparian Areas, Wetland, and Water Resources management actions under Alternative D would allow new water developments to occur only when GRSG PGMA and PPMAs would benefit. This differs from Alternative B by including PGMA along with PPMAs. However, most water developments are implemented in association with livestock grazing management, with focus on alleviating or excluding riparian areas from livestock use in order to obtain PFC and improving distribution in the uplands, thereby benefiting GRSG habitat. Therefore the amount of short-term impacts due to new water developments would be the same as Alternative A, as most spring developments are associated with improved grazing management. The alternative also includes making necessary modification to existing developments within PPMAs to maintain

the continuity of the predevelopment riparian area, which also is included under Alternative B. This would increase the amount of acres of short-term impacts on vegetation to make necessary modifications when compared with Alternative A. However, this would also indirectly increase the amount of acres of vegetation improvement in the long term through the proper maintenance of the development, with the assumption that grazing management is meeting or making progress towards BLM Land Health Standards.

Impacts from Vegetation and Soils Management

All vegetation and soils management activities would be prioritized in PPMAs and PGMA areas under this alternative. Treatments would prioritize the use of native seed and establishing appropriate sagebrush species/subspecies that meet GRSG seasonal habitat requirements (see **Table 2-3**, Comparative Allocation Summary of Alternatives). This includes ESR, invasive species/noxious weed, conifer encroachment, and restoration activities. Management actions would be designed to establish and maintain a resilient sagebrush vegetative community and restore sagebrush vegetation communities to reduce habitat fragmentation and maintain or re-establish habitat connectivity over the long term.

Treatments would also be rested from livestock for two growing seasons or until vegetation or habitat objectives are met. Treatments would be implemented only for the benefit of GRSG or the identified GRSG objective. These restrictions would increase the amount of acres treated in PPMAs and PGMA areas compared with Alternative A, and decrease the amount of acres treated outside of PPMAs and PGMA areas. Under this alternative more fires would be suppressed to protect sagebrush, and fewer acres of sagebrush habitat would be lost to fire in PPMAs reducing the amount of ESR treatments needed when compared with Alternative A. However, with suppression efforts focused on PPMAs and PGMA more acres would likely burn in areas outside PPMAs and PGMA increasing the need for ESR treatments in non- GRSG habitat.

Impacts from Livestock Grazing Management

Under Alternative D, grazing management to achieve vegetation composition and structure consistent with ecological site potential could maintain or enhance sagebrush and perennial grass conditions within priority habitat. In those areas not meeting GRSG habitat objectives, the rest and seasonal changes could improve sagebrush communities by relieving some grazing pressure. Drought management actions to remove livestock temporarily when plants are stressed would help to maintain desired plant communities. Livestock resting during herbaceous plant growth would help to increase vigor of desired plants. This would provide a more resilient plant community to withstand livestock grazing pressure.

Impacts from Fire and Fuels Management

Wildfire Management

Wildfire management will provide first for firefighter and public safety, and then set priorities to protect communities, infrastructure, improvements, and natural and cultural resources based on values to be protected, human health and safety, and costs. These priorities are outlined under the current Federal Wildland Fire Management Policy. As safety allows, in PPMAs and PGMA unburned islands and patches of sage brush would be retained, as well as minimizing burn-out operations in priority and general habitat. Under this alternative, fewer acres of sagebrush habitat in PPMAs and PGMA would be converted to an early seral stage, and would have less risk for invasive grass and noxious weed invasion than under Alternative A.

As a direct result of actions, more fires would be suppressed in the surrounding vegetative communities to protect sagebrush, and fewer acres of sagebrush habitat would be lost to fire. However, indirect impacts of fire suppression could lead to a greater potential for catastrophic fire in the future as a result of fire exclusion over the long term due to increases in fuel loading in PPMAs and PGMAs. With suppression efforts focused on PPMAs and PGMAs more acres would likely burn in areas outside of these areas. This could lead to catastrophic fires converting sagebrush habitats to early seral stage in or to annual grasslands in low elevations not considered GRS habitat. Changes in soil, vegetation, and water properties would be more likely to occur outside of PPMAs and PGMAs under this alternative.

Fuels Management

Fuels management treatments would be prioritized inside and outside of PPMAs to prevent large scale loss of habitat. Treatment design would locate projects adjacent to existing disturbances such as power lines, roads, fence lines, and other disturbances where feasible. No treatments would be allowed in PPMAs or PGMAs if it is determined that the treatment would not be beneficial to GRS habitat. Treatment types would place emphasis on maintain, protecting, and expanding GRS habitat. A full suite of integrated vegetation treatments, including but not limited to chemical, mechanical, seeding, and prescribed fire treatments as appropriate would be used to enhance priority habitat and restore general habitat that are currently in FRCC 2 and FRCC 3 fire classes.

The use of native seed would be required for fuels management treatment based on availability, adaptation (site potential), and probability of success. Non-native seeded species may be used as a fire resistant fuels treatment. In all cases, seed must be certified weed-free. This alternative is more restrictive than Alternative A, but would not likely decrease the amount of acres treated overall; however, it would increase the amount of acres treated in and adjacent to PPMAs and PGMAs areas compared with Alternative A. This alternative would also ensure that the treatment would be beneficial to GRS or it would not be implemented. Indirectly the fuels projects under this alternative would lead to fewer acres burned in and adjacent to PPMAs and PGMAs than under Alternative A.

Impacts from Wild Horse and Burro Management

Adjustments to AML numbers could alter vegetation structure and composition by removing some of the disturbance caused by wild horse and burro movement across the landscape. In those areas on BLM-administered lands not meeting Standards for Rangeland Health, where causal factors are due to wild horse and burro populations, adjustments to AML could help to improve vegetation conditions. Passive restoration methods may not allow for conversion to a different vegetation community, as described in state-and-transition models. This applies to those vegetation communities that have passed a threshold, or transition, away from a reference or desired state. Unlike community pathways, transitions are not reversible by simply altering the intensity or direction of the factors that produced the change and instead require the application of distinct factors such as the addition of seeds, the removal of shrubs, or the addition of top soil (Bestelmeyer et al. 2003).

Impacts from Climate Change Management

Under Alternative D, vegetation treatments would be implemented as climate change strategies. These treatments would reduce the presence of cheatgrass, reduce conifer encroachment in priority GRS habitat, and seed shrubs and grasses. These treatments would help to maintain

or enhance vegetation that comprises GRSG habitat. Hazardous fuels treatments would be implemented with design towards improving wildlife and GRSG habitat. Vegetation conditions would be improved in moderate to high quality habitat where bioclimatic conditions are predicted to persist through 2050.

Impacts from Leasable Minerals Management

Under Alternative D, no new surface occupancy would be authorized. This could reduce vegetation and soils disturbance. This would minimize disturbance to vegetation and soils. Exploration activities would be allowed as long as sagebrush species are not crushed. This could maintain sagebrush health and resiliency in priority habitat. Although lands may be listed as withdrawn, there may not be a resultant change in vegetation or soil conditions.

Impacts from Locatable and Salable Minerals Management

Under Alternative D, no new surface occupancy would be authorized. This could reduce vegetation and soils disturbance. This would minimize disturbance to vegetation and soils. Mitigation measures could increase sagebrush and perennial grass communities in off-site areas to compensate for permitted loss of sagebrush loss. Lands already leased would continue under current management.

Impacts from Land Uses and Realty Management

Under Alternative D, new ROW actions would be restricted to the footprint of existing ROWs. This would keep any new disturbance to vegetation or soils to previously disturbed locations. This Alternative involves burial of new or existing power lines where feasible and this could increase the disturbance of vegetation and soils in new locations. This could maintain sagebrush/perennial grass vegetation communities within the priority habitat in the planning area. Vegetation conditions could increase where other developments, such as fences and roads would be reclaimed if they are no longer in use.

Impacts from Renewable Energy Management

Under Alternative D, wind and solar energy development would be excluded in PPMAs and PGMAs. Vegetation and soils disturbance from energy development would be minimized or eliminated in priority habitat containing sagebrush/perennial grass vegetation communities. Although lands may be listed as excluded from energy development, there may not be a resultant change in vegetation or soil conditions. Under Alternative B, disturbance to sagebrush would be limited to 3 percent surface disturbance. This could maintain sagebrush/perennial grass vegetation communities within the priority habitat in the planning area.

Impacts from Comprehensive Travel and Transportation Management

Limiting motorized travel to designated roads, primitive roads and trails under Alternative D would minimize disturbance of vegetation and soils from vehicle traffic within the planning area. Limiting or prohibiting construction of new roads would minimize disturbance to vegetation and soils in priority habitat. Mitigation measures could increase the sagebrush/perennial grass community type to offset any loss of sagebrush. Requiring certified weed free seed for reclamation of roads would minimize invasive species establishment or spread.

Impacts from Recreation Management

Under Alternative D, only SRPs that have neutral or beneficial impacts on priority habitat would be authorized. This could limit the disturbance to vegetation and soils within priority habitat. No new construction of recreation facilities in priority or general habitat would reduce anthropogenic disturbance to soils and vegetation.

4.4.8. Alternative E

Impacts from Greater Sage-Grouse Management

Under Alternative E, lands would be managed to meet GRSG and habitat objectives. Lands would be managed for a no net loss of sagebrush vegetation. Also, sagebrush communities would be avoided, minimized or mitigated from anthropogenic disturbances. Disturbance would be limited to disturbances greater than or equal to 5 percent of 640 acres (32 acres) within Occupied/Suitable Habitat would trigger habitat evaluation and consultation with the Sagebrush Ecosystem Technical Team. This would directly or indirectly increase sagebrush vegetation.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Under Alternative E, invasive and noxious weeds would be more actively controlled. This would help to maintain native riparian vegetation and help prevent soil erosion.

Impacts from Vegetation and Soils Management

Under this alternative the fundamental hierarchical decision-making policy of "Avoid, Minimize and Mitigate" would be followed. The alternative assigns the Nevada Sagebrush Ecosystem Council with establishment of policies for the identification and prioritization of landscape-scale enhancement, restoration, fuel reduction, and mitigation projects. Without knowing what actions would be taken by the Council, it cannot be determined fully what level of impacts this alternative would have. The main goal of the alternative is to achieve conservation through a concept of "no net loss" in the Occupied, Suitable and Potential Habitat categories within the sagebrush ecosystem for activities that can be controlled such as a planned disturbance or development. Therefore, this alternative would limit the amount of disturbance to vegetation, but would also mitigate any vegetation losses with treatments designed to improve vegetation. Since mitigation would only occur after all appropriate and practicable avoidance and minimization measures have been taken, the level of mitigation treatments is unknown. However, this alternative would limit habitat disturbance, including habitat improvement projects, in Occupied and Suitable Habitat to not more than five percent of a section per year, per SGMA, unless habitat treatments show credible positive results. This limit would not apply to removal of invasive or encroaching vegetation where such removal actually creates habitat. Therefore, this alternative could improve more acres of vegetation within GRSG habitat than Alternative A. Sage Steppe Ecosystem Restoration Strategy in northern California actions are intended to provide design and implementation guidelines for effective sagebrush restoration. These actions are likely to improve GRSG habitat.

Impacts from Livestock Grazing Management

Under Alternative E, grazing management to achieve vegetation composition and structure consistent with ecological site potential could maintain or enhance sagebrush and perennial grass conditions within SGMAs. In those areas not meeting GRSG habitat objectives, the rest and seasonal changes could improve sagebrush communities by relieving some grazing pressure. Management under Alternative E would encourage grazing practices that would

promote the health of perennial grass communities to suppress cheatgrass. This may not control or reduce the existing invasive species presence. The dominance of cheatgrass and medusahead in the intermountain West, partly caused by extensive overgrazing in the late 1800s and early 1900s, would not be rectified by simply removing cattle or by reducing their numbers. The new cheatgrass-dominated “steady state” would require massive levels of fossil fuel input via herbicides, seeding, fertilizing, etc., to restore the pre-settlement flora (Sheley and Petroff 1999). Passive restoration methods may not allow for conversion to a different vegetation community, as described in state-and-transition models. This applies to those vegetation communities that have passed a threshold, or transition, away from a reference or desired state. Unlike community pathways, transitions are not reversible by simply altering the intensity or direction of the factors that produced the change and instead require the application of distinct factors such as the addition of seeds, the removal of shrubs, or the addition of top soil (Bestelmeyer et al. 2003).

Impacts from Fire and Fuels Management

Wildfire Management

The type of impacts from wildland fire management would be similar as those described under Alternative D except they would apply to SGMAs rather than PPMAs and PGMAs. This alternative also relies on some actions that are not under the control of federal agencies, such as the use of the Nevada Division of Forestry, County Fire Protection Districts, and volunteer firefighting forces which are currently in place throughout Nevada.

Fuels Management

This alternative would limit habitat disturbance, including habitat improvement projects, in Occupied and Suitable Habitat to not more than five percent per year, per SGMA, unless habitat treatments show credible positive results. This limit would not apply to removal of invasive or encroaching vegetation where such removal actually creates habitat. The alternative would also allow the construction of temporary roads for fuels reduction projects within pinyon and juniper treatment areas. Once the treatment is complete the temporary roads would be removed and restored having no negative impact. This alternative would also limit the amount of fuels treatments in winter habitat and the use of prescribed fire within Wyoming big sagebrush communities. Alternative E would focus fuels treatments within occupied habitat, therefore reducing the risk of large catastrophic wildfires. This would lead to fewer acres burned within GRSG habitat when compared with Alternative A.

Impacts from Wild Horse and Burro Management

Under Alternative E, wild horse and burro populations would be managed to AML to avoid and minimize impacts on SGMAs. It is expected that vegetation and soils within SGMAs impacts on vegetation and soils would be the same as Alternative A.

Impacts from Climate Change Management

Under Alternative E, climate change adaptation strategies would be determined by the Nevada Sagebrush Ecosystem Council, Nevada Sagebrush Ecosystem Technical Team and Nevada Sagebrush Mitigation Bank Program. Impacts on vegetation and soils could be enhanced or reduced based on decisions and actions of the above mentioned groups.

Impacts from Leasable Minerals Management

Under Alternative E, avoidance management, and enhancement and reclamation of disturbed lands would be implemented to preserve, protect, and improve habitat in SGMAs. This could minimize vegetation and soil disturbances in those areas. Other leasable minerals management activities would be located outside SGMAs. This could enhance or maintain vegetation and soils in occupied, suitable and potential habitats. Although lands may be listed as avoided, there may not be a resultant change in vegetation or soil conditions. Active reclamation efforts using native plants would help to increase sagebrush/perennial grass communities in areas of previous disturbance. Active invasive and noxious weed control in disturbed areas could help to decrease non desirable vegetation and increase desired sagebrush/perennial grass communities.

Impacts from Locatable and Salable Minerals Management

Under Alternative E, exploration activities for notice level projects would be limited to five acres of disturbance. This could minimize vegetation and soil disturbances in those areas. Other mining activities would be avoided to non-habitat. This could enhance or maintain vegetation and soils in occupied, suitable and potential habitats. Although lands may be listed as avoided, there may not be a resultant change in vegetation or soil conditions. Active reclamations efforts using native plants would help to increase sagebrush/perennial grass communities in areas of previous disturbance.

Impacts from Land Uses and Realty Management

Under Alternative E, facilities and activities would be avoided in occupied, suitable and potential habitat. This could enhance or maintain vegetation and soils within those three habitat categories. Although lands may be listed as avoided, there may not be a resultant change in vegetation or soil conditions. Active invasive and noxious weed control in ROW areas could help to decrease non desirable vegetation and increase desired sagebrush/perennial grass communities.

Impacts from Renewable Energy Management

Under Alternative E, facilities and activities would be avoided in occupied, suitable and potential habitat. This could enhance or maintain vegetation and soils within those three habitat categories. Although lands may be listed as avoided, there may not be a resultant change in vegetation or soil conditions. Active invasive and noxious weed control in ROW areas could help to decrease non desirable vegetation and increase desired sagebrush/perennial grass communities.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative E, OHV routes would be designated to areas outside of SGMAs. Depending on the travel designation in areas outside of SGMAs, vegetation could be either enhanced or stressed from mechanical traffic. Areas where designation is limited or closed would likely enhance existing sagebrush/perennial grass communities. Areas where designation is open may see more soil erosion due to mechanical traffic from vehicle tires. Disturbance from OHV use on vegetation and soils could be reduced in the SGMAs through the avoidance, minimization, and mitigation of sagebrush/perennial grass communities.

Impacts from Recreation Management

Under Alternative E, OHV routes would be designated to areas outside of SGMAs. Disturbance from OHV use on vegetation and soils could be reduced in these SGMAs.

4.4.9. Alternative F

Impacts from Greater Sage-Grouse Management

Under Alternative F, disturbance to sagebrush would be limited to 3 percent surface disturbance. This could maintain sagebrush/perennial grass vegetation communities within the priority habitat in the planning area. Under Alternative F, passive restoration would be implemented in unoccupied habitat that may be occupied if converted to a potential natural community. Passive restoration methods may not allow for conversion to a different vegetation community, as described in state-and-transition models. This applies to those vegetation communities that have passed a threshold, or transition, away from a reference or desired state. Unlike community pathways, transitions are not reversible by simply altering the intensity or direction of the factors that produced the change and instead require the application of distinct factors such as the addition of seeds, the removal of shrubs, or the addition of top soil (Bestelmeyer et al. 2003).

Impacts from Riparian Areas, Wetlands and Water Resources Management

No new water developments for diversion from spring or seep sources would be allowed within GRSG habitat under this alternative. This would remove the ability to construct any spring/seep developments within PGMA or PPMAs and would lead to less acres of disturbance to vegetation in the short term related from the direct impact of construction when compared with Alternative A. However, this could lead to an increase in construction of other water developments such as stock ponds and other water catchments not directly diverting water from springs or seeps. This would lead to a greater amount of acres disturbed to upland vegetation when compared with Alternative A since the disturbance related to spring developments is only for a short term and typically are rehabilitated after construction. With the construction of stock tanks the loss of vegetation association with the project would be long term due to the replacement of vegetation with a small reservoir.

Under Alternative F, riparian areas would be managed for PFC or pertinent Forest Plan standards and guidelines. Both vegetation and soils are assessed to determine if a system is at PFC. Vegetation and soils would likely be resilient to withstand 25 year flood events when at PFC. Diversity of riparian vegetation could be increased if managed to the potential natural community. Under this alternative, no new water developments would be constructed, minimizing additional surface disturbance to vegetation and soils.

Impacts from Vegetation and Soils Management

The type of impacts from vegetation and soils management would be the same as those described under Alternative B, with the exception that this alternative would exclude livestock grazing from burned areas until woody and herbaceous plants achieve GRSG habitat objectives. This would keep livestock off burned areas for a longer period than Alternative B and could speed up burned area recovery towards meeting GRSG habitat requirements. However, this action could indirectly lead to heavier fuel loading and a greater potential for fire reoccurrence.

Impacts from Livestock Grazing Management

Under Alternative F, utilization levels of 25 percent could leave fine fuel levels at a high risk for wildfire. This could produce an increase in perennial grass vigor due to reduced grazing pressure. Under Alternative F, 25 percent of grazing areas within the planning area would be rested from grazing each year. This could increase the resiliency of grazed species.

Impacts from Fire and Fuels Management

The type of impacts from wildland fire management would be the same as those described under Alternative B.

The type of impacts from fuels management would be the same as those described under Alternative B.

Impacts from Wild Horse and Burro Management

Wild horse AMLs would be reduced by 25 percent within occupied GRSG habitats. While impacts from wild horses and burros would remain, this would reduce the effects of wild horses described under Alternative A. More residual grasses and forbs would likely remain within occupied GRSG habitat that overlaps HMAs/WHBTs.

Impacts from Climate Change Management

Under Alternative F, impacts on vegetation and soils would be the same as Alternative B.

Impacts from Leasable Minerals Management

Under Alternative F, impacts on vegetation and soils would be the same as Alternative B.

Impacts from Locatable and Salable Minerals Management

For locatable minerals under Alternative F, all lands within priority habitat would be petitioned for withdrawal from mineral development. This could reduce the vegetation and soil disturbance when compared with Alternative A. Although lands may be listed as withdrawn, there may not be a resultant change in vegetation or soil conditions.

Impacts from Land Uses and Realty Management

Under Alternative F, new ROW actions would be restricted to the footprint of existing ROWs. This would keep any new disturbance to vegetation or soils to previously disturbed locations. This Alternative involves burial of new or existing power lines where feasible and this could increase the disturbance of vegetation and soils in new locations. Vegetation conditions could increase where other developments, such as fences and roads would be reclaimed if they are no longer in use.

Impacts from Renewable Energy Management

Under Alternative F, vegetation and soils disturbance from wind energy development would be minimized in priority habitat containing sagebrush/perennial grass vegetation communities. The buffer distances of 5 miles between wind energy development and leks and 4 miles from wind energy development and winter habitat could minimize vegetation and soils disturbance due to the construction and maintenance of those facilities in the buffered areas.

Impacts from Comprehensive Travel and Transportation Management

Limiting motorized travel to existing routes under Alternative F would minimize disturbance of vegetation and soils from vehicle traffic within the planning area. Limiting or prohibiting construction of new roads would minimize disturbance to vegetation and soils in PPMAs.

Mitigation measures could increase the sagebrush/perennial grass community type if disturbance exceeds the three percent threshold.

Impacts from Recreation Management

Under Alternative F, impacts on vegetation and soils would be the same as Alternative B.

4.5. Riparian Areas and Wetlands

This section discusses impacts on riparian areas and wetlands from existing management actions and resource uses by alternative. Refer to **Chapter 3** for a discussion of existing riparian and wetland areas within the planning area (**Section 3.4**, Riparian Areas and Wetlands).

4.5.1. Methods and Assumptions

Acres of riparian areas and wetlands were calculated from the National Wetlands Inventory database (USFWS 2013b).

Indicators

Indicators of impacts on riparian areas and wetlands are as follows:

- Amount and condition of riparian and wetland vegetation.

Assumptions

- 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.
- New invasions of noxious and invasive weeds would continue to occur and spread as a result 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.
- Ecological health and ecosystem functioning depend on a number of factors, including vegetative cover, species diversity, nutrient cycling and availability, water infiltration and availability and percent cover of weeds.
- Short-term effects on riparian and wetland vegetation would occur over a timeframe of two years or less and long-term effects would occur over longer than two years.
- Impacts from wild burros to riparian areas and wetlands in PPMAs and PGMAs are considered negligible in comparison with impacts from wild horses.
- Implementation and effectiveness of management actions on riparian areas and wetlands may be limited by funding, political constraints, workloads, enforcement, compliance, staffing levels, litigation, conflicting priorities and regulations, climate change, and other factors.

Riparian areas and wetlands in PPMAs and PGMAs within the sub-region are estimated to total 48,700 acres (USFWS 2013b) (note; this figure likely underestimates total riparian-wetland acres in sub-region). Some alternatives, especially Alternative C, may result in an increase in

this acreage. All alternatives would result in an improvement in both condition and trend of riparian areas over time. Improvement in riparian habitat conditions is assumed to be lowest for Alternative A and highest for Alternatives C and F.

4.5.2. Nature and Type of Effects

Type of effects of land uses or management actions on riparian areas and wetlands can include direct, indirect and cumulative effects (refer to **Section 5.5**, Riparian and Wetland Resources, for a discussion of cumulative impacts on riparian areas). Direct effects typically include compaction of soils and loss or alteration of riparian plants and riparian plant communities. Indirect effects are often the result of actions implemented for reasons other than management of riparian habitats but result in impacts on riparian habitats. The nature of these effects can vary from negligible to substantial depending on timeframes, condition of the riparian system and types of land or resource uses. Generally effects which are chronic in nature and occur over long periods of time are more significant to riparian resources than effects which are short term and temporary. Riparian and wetland plant communities are typically more resilient than uplands to minor or temporary disturbances because of the availability of moisture and a longer growing season. More information on the nature and types of effects from land uses and management actions on riparian areas and wetlands analysis is presented below.

Impacts from Greater Sage-Grouse Management

Short- and long-term direct and indirect effects on riparian areas and wetlands as a result of GRSG management efforts within the planning area are positive. Priority riparian habitats including areas important for late brood rearing would be targeted for improvement through efforts to improve GRSG habitat. Improvement of riparian areas and wetlands would be included as an important consideration in implementing changes in livestock grazing practices, prioritizing wild horse gathers, developing restoration projects, prioritizing weed treatments and adopting mitigation and avoidance measures for surface disturbing activities in areas of GRSG habitat. Efforts to manage GRSG would also result in increased focus on inventory and assessment of priority riparian areas leading to identification of opportunities to enhance or protect these areas.

Impacts from Riparian Areas and Wetlands Management

Riparian management results in positive direct and indirect effects on riparian areas and wetlands over both the short term and long term. Direct effects include restoration and enhancement of riparian habitats, while indirect effects can include restoration, management or enhancement of surrounding uplands or of watersheds in general. Many programs including range, wildlife (including special status species), wild horses and burros, vegetation (including restoration, fuels, weeds) and fire (including burned area rehabilitation and prescribed burning) are designed to improve overall health and resiliency of rangeland habitat often resulting in long-term direct or indirect benefit to riparian areas. In the case of locatable, salable and leasable minerals, management of riparian areas often includes incorporating measures such as avoidance, use of best management practices and mitigation into permitting documents to reduce or eliminate impacts.

Impacts from Water Resources Management

Water management can have both positive and negative direct and indirect effects on riparian areas and wetlands. Generally, these effects are long term. BLM and the Forest Service typically manage water resources indirectly through practices which promote watershed health

or through permitting activities which provide direction on activities affecting water use such as mine dewatering, energy development or construction of range improvements. Generally, watershed management practices which increase health of vegetative communities (both upland and riparian) have a direct or indirect long-term positive effect on riparian areas and wetlands. Functional watersheds stabilize soil and reduce erosion; provide resiliency against disturbance including wildfire, weed infestations and grazing; capture and store water; and, provide a filtering mechanism for pollutants (See **Section 3.15**, Water Resources).

Negative direct and indirect effects on riparian areas from water management activities associated with mining operations, spring developments or other land uses can include loss of vegetation and soil and loss or diversion of surface or subsurface flows. In some cases, these impacts are mitigated by enhancing or protecting riparian areas and wetlands in other locations. State of Nevada regulations also require users of surface water to provide access to wildlife, thus reducing impacts of permitted diversion projects.

Impacts from Vegetation Management

Impacts on riparian areas are often indirect and include overall improvement of rangelands and watersheds (refer to above discussion on benefits of functional watersheds). In the case of weed control, impacts can be direct and positive where removal of invasive plants can result in establishment and expansion of riparian and wetland plant species. Direct positive impacts on riparian areas can also occur where vegetative management practices include reseeding of burned or disturbed floodplains. Generally, these impacts are long term.

Impacts from Livestock Grazing Management

Livestock management is probably the single most important factor affecting riparian areas and wetlands within the sub-region since livestock grazing is so wide spread and since livestock are highly attracted to riparian areas. Although they comprise only a small percent of the total planning area, riparian habitats often the only sources of succulent forage and water once uplands become desiccated. The detrimental effects of poor livestock grazing practices on riparian areas are well documented (refer to **Section 3.4**, Riparian Areas and Wetlands).

Direct and indirect effects on riparian areas and wetlands from managed livestock grazing are generally positive. Managed grazing can directly benefit riparian systems by reducing those impacts from grazing which are considered detrimental to proper functioning of riparian ecosystems (See **Section 3.4**, Riparian Areas and Wetlands). More importantly, managed grazing benefits riparian areas and wetlands by allowing for growth and establishment of riparian plant communities. Especially where functionality of riparian systems is dependent on riparian and wetland plants, properly managed grazing would help to ensure long-term health and sustainability of the riparian-wetland resource. Healthy riparian systems are resilient to disturbances such as floods, droughts and wildfires (Prichard et al. 1999; Dalldorf et al. 2013; Chaney et al. 1993).

Numerous strategies to improve stream and riparian habitat conditions through proper management of livestock have been developed and implemented on western rangelands in recent decades. Strategies range from fencing and removal of riparian areas from adjoining grazed uplands to establishing limits on streambank trampling and riparian plant use to developing prescriptive grazing protocols to reduce duration and frequency of hot season use (Wyman et al. 2006; Chaney et al. 1993; Clary and Webster 1989). Techniques such as riding and herding, use of supplements and construction of water developments are also commonly applied separately or in conjunction with grazing systems to reduce livestock use of riparian areas (Wyman et al.

2006). The importance of incorporating an adaptive approach to riparian grazing management is also gaining recognition.

Several common themes emerge from the literature addressing livestock grazing management for riparian areas. These include:

- Riparian areas should be managed in conjunction with surrounding uplands (Wyman et al. 2006; Chaney et al. 1993). Healthy riparian systems are a function of healthy watersheds.
- Merely reducing stocking rates rarely solves problems until other factors, such as season of use, are addressed (Wyman et al. 2006; Leonard et al. 1997).
- Development of riparian grazing strategies is often highly site-specific, and there are no “one size fits all” solutions (Wyman et al. 2006; Leonard et al. 1997).
- The majority of successful riparian grazing systems are based on reducing frequency and duration of hot season grazing on riparian areas over time (Wyman et al. 2006; Chaney et al. 1993; Ehrhart and Hansen 1997; Dalldorf et al. 2013; Elmore and Kauffman 1994).
- Understanding and incorporating livestock management goals into the development of a riparian grazing system is important to success (Wyman et al. 2006; Ehrhart and Hansen 1997).

Range improvements associated with livestock management, including construction of water developments and fences, can have both direct and indirect short and long-term impacts on riparian areas and wetlands. Water developments can indirectly benefit riparian and wetland areas by providing offsite water sources for livestock thus reducing use of riparian areas. Similarly, fencing provides a means for control and management of livestock allowing for growth and establishment of riparian plants. Negative effects can occur when water developments affect hydrologic function of springs or other riparian areas by interrupting normal flow patterns (generally, direct impacts from fences on riparian areas are minor). Although new range improvements are implemented through the NEPA process and typically include measures to avoid or eliminate adverse impacts, many older developments in PPMAs and PGMA within the sub-region were poorly constructed or are in various stages of disrepair. Consequently, many of these older developments are acting to drain water away from spring sources or otherwise adversely affecting the ability of the riparian system to function properly.

Impacts from Fire and Fuels Management

Direct and indirect effects on riparian areas and wetlands from fire and fuels management are generally positive. Treatments including reseeding of burned drainage bottoms or reducing of heavy fuel loads adjacent to riparian areas represents a direct benefit. Management which targets protection or enhancement of surrounding watersheds through reseeding, prescribed fire or through application of mechanical or chemical fuel treatments represents an indirect benefit. Both direct and indirect effects from fire and fuels management are generally long term.

Impacts from Wild Horse and Burro Management

Direct and indirect impacts on riparian areas and wetlands from management of wild horses and burros are positive. By managing wild horse and burro populations for other multiples uses and for a “thriving ecological balance” impacts in the form of trampling and overuse of vegetation on both uplands and riparian areas are reduced. Management of wild horses and burros at or

below AMLs also provides an indirect benefit to riparian areas and wetlands when conflicts with livestock management fences are reduced. These impacts are long term.

Impacts from Climate Change Including Management

The direct and indirect effects of climate change on riparian areas and wetlands are assumed to be negative. Increased ambient and water temperatures, changes in flow regimes and reduced stream flows can negatively affect riparian ecosystems (See **Section 3.22**, Climate Change). Efforts to mitigate these effects through proactive strategies to address climate change would provide an indirect benefit to riparian areas. Negative effects are long term.

Impacts from Leasable Minerals Management

Impacts are both direct and indirect and can include potential to diminish the flow of springs and seeps due to groundwater withdrawal, loss of vegetation, soil compaction, potential chemical contamination of surface water if a connection exists or develops between the oil/gas reservoir and surface water, siltation due to construction activities and vehicle use, and potential for spills to water ways. These impacts can be short or long term. Note that standard drilling requirements isolate the wellbore from surface water and deeper aquifers. Management also includes closing areas to surface occupancy and providing for stipulations which protect riparian areas and wetlands from disturbance. Areas closed to surface occupancy include wilderness, wilderness study areas, and special recreation management areas. Stipulations to protect riparian areas or mitigate impacts are incorporated into leases through the NEPA process.

Impacts from Locatable and Salable Minerals Management

For locatable minerals, all PPMAs and PGMA within the planning area (excluding limited areas withdrawn or petitioned for withdrawal) are open to mineral exploration and development under the 1872 Mining Law. Direct and indirect impacts on riparian areas and wetlands are similar to those described for Leasable Minerals Management (with the exception of those impacts specific to oil and gas development). Requirements to prevent undue or unnecessary degradation allow for development of measures to avoid or mitigate impacts through Notices of Intent and Plans of Operation. Mitigation measures which include projects or funds to enhance and protect riparian habitats can have positive direct and indirect impacts.

Impacts from Land Uses and Realty Management

Establishment of rights of way exclusion or avoidance areas provides an indirect positive benefit to riparian and wetland habitats by protecting these areas from disturbance. Retention of lands in public ownership also provides an indirect positive benefit since further use or development of these areas would be subject to environmental review. These impacts are long term.

Impacts from Renewable Energy Management (Geothermal only)

Impacts on riparian areas and wetlands from geothermal energy development are mostly the same as those described for Fluid Minerals. However, water management activities from geothermal development including injection can also alter temperatures or chemistry of the ground water and any associated hot springs or seeps. Stipulations to protect riparian areas or mitigate impacts are incorporated into leases through the NEPA process.

Impacts from Comprehensive Travel and Transportation Management

Area designations of closed or limited to off-highway vehicle use represent indirect positive effects on riparian areas and wetlands, while a designation of open represents a negative long-term effect. Impacts on riparian areas from both highway vehicles and OHVs are variable and depend on the frequency of use, soil/substrate present, and transportation route design/construction. Where proper crossings have been installed (e.g., properly sized culverts, bridges, rock crossing, etc.) or where substrate is durable, transportation impacts may be negligible. Where vehicle use crosses finer sediments without proper armoring, compaction and rutting can occur. Roads in general can alter surface flows and accelerate erosion through loss of vegetation which leads to loss of water tables and further loss of riparian vegetation (See **Section 3.4**, Riparian Areas and Wetlands).

Impacts from Recreation Management

Although impacts from recreation on riparian areas and wetlands including trampling and compaction and loss of soil and vegetation negatively affect riparian areas, managed recreation can directly or indirectly benefit riparian resources. Mitigation or avoidance of impacts through the process of issuing Special Recreational Use (SRU) permits or through the establishment of SRMAs can result in protection of riparian areas and wetlands from human caused disturbance over the long term.

Impacts from Special Designations Management

Special designations of WSAs, ACECs, RNAs, NSHTs, WSRs, NCAs, and Wilderness indirectly benefits riparian areas and wetlands. These designations all include restrictions on surfaces use which could result in protection of associated riparian habitats over the long term.

4.5.3. Impacts Common to All Alternatives

All alternatives have at least some provisions that would directly and indirectly benefit riparian areas and wetlands over the long term.

Resource and Land Uses Not Considered Further

Wind and solar energy development and conifer removal create few impacts because this type of development does not generally occur in riparian areas or wetlands. Because sites for wind and solar energy development do not typically include drainage bottoms, wetlands or other low lying areas, impacts on riparian habitats from these land uses are typically negligible. Although removal of conifers can increase water yields indirectly benefiting riparian resources, generally conifer removal treatments are intended to improve upland habitats for GRSG or other species.

4.5.4. Alternative A

Impacts from Greater Sage-Grouse Management

Although management of the GRSG is not consistently provided for in existing LUPs across the sub-region, the delineation of PMUs in Nevada and Northeastern California and the development of local working groups would focus management and monitoring efforts on priority habitat including riparian areas. Condition and trend of important riparian areas and wetlands within PMUs would likely improve under this alternative.

Impacts from Riparian Areas and Wetlands Management

All LUPs within the sub-region recognize importance of riparian areas and wetlands and include guidance for protection or enhancement of this resource within PPH and PGH. Priority riparian habitats are targeted for improvement while impacts on riparian areas as a result of management actions or authorizations are considered through the NEPA process. Many livestock grazing systems developed through the permit renewal process and through assessments of rangeland health are focused on improving riparian habitat conditions. In some cases, mitigation programs developed for land uses such as mining have resulted in restoration of thousands of acres of riparian areas and wetlands in PPH and PGH.

Condition and trend data for riparian and wetland habitats within the planning area suggest existing programs which directly or indirectly provide for riparian area management are only partially effective (see **Section 3.4**, Riparian Areas and Wetlands). Generally, restoration efforts have been focused on priority streams habitats, especially those supporting fisheries. Although highly important to GRSG, lentic riparian areas have received less focus likely because they are small in size, widespread and more difficult to manage. Under this alternative, condition and trend of riparian areas and wetlands in PPH or PGH is likely to improve but progress may not be consistent across the planning area.

Impacts from Water Resources Management

Under Alternative A, the BLM and Forest Service would continue to manage programs designed to improve watershed function (fire and fuels, vegetation, livestock, and wild horse and burro management) would continue to result in improvement in condition and trend of riparian areas and wetlands within the sub-region. Where land uses such as mining or energy development impact water resources, stipulations or mitigation measures developed through the NEPA process would continue to have the effect of reducing impacts on riparian areas or in the case of offsite mitigation, have the potential to enhance riparian areas.

Impacts from Vegetation Management

Under Alternative A, vegetation would continue to be managed under the Integrated Vegetation Management policies. Condition of riparian areas and wetlands would be maintained or improved where these policies are applied.

Impacts from Livestock Grazing Management

All districts and offices on BLM-administered lands within the sub-regional decision area are subject to meeting the standards for rangeland health including the standard that riparian and wetland sites exhibit a properly functioning condition and achieve state water quality criteria. On Forest Service-administered lands, riparian areas are managed through a combination of utilization standards and design features discussed/documentated each year in the AOI as well as response to direction found in AMPs. Functional condition of riparian areas and wetlands are considered in the development of riparian utilization standards. Partnerships involving restoration of intermingled public and private lands are increasingly being implemented in PPH and PGH throughout the sub-region. These collaborative watershed restoration efforts are resulting in improvement in many miles and acres of lotic and lentic riparian habitats in GRSG habitat. Flexibility in designing and implementing prescriptive riparian grazing management is a key factor in the success of these collaborative efforts.

Under Alternative A, there are no “fallback standards” (standards applied when other approaches to grazing management have not been effective) in PPH and PGH. This situation, in combination

with limitations to effectiveness discussed under assumptions, likely contributes to variable success in meeting goals for riparian areas across the planning area (see **Section 3.4**, Riparian Areas and Wetlands).

Range improvements which are properly constructed and analyzed would continue to improve condition and trend of riparian habitats in PPH and PGH within the sub-region through better distribution and management of livestock. However, there are no existing requirements for remediating older developments which may be draining spring sources or causing other forms of damage to riparian areas. Condition and trend of riparian areas and wetlands affected by nonfunctional or poorly designed developments would likely continue to decline or would not improve.

Based on the above discussion, condition and trend of riparian areas and wetlands in PPH and PGH is likely to improve in portions, but not all, of the sub-region.

Impacts from Fire and Fuels Management

Under current strategies and policies for management of fires and fuels, condition of riparian areas and wetlands within the sub-region would either be maintained or improved.

Impacts from Wild Horse and Burro Management

Where wild horse and burro populations are managed at or below AMLs and where riparian and wetland areas occur in PPH and PGH in horse management areas, condition and trend of riparian current riparian habitat conditions would be maintained. Where numbers of wild horses are in excess of desired levels, condition and trend of riparian habitats (especially lentic riparian areas) would decline.

Impacts from Climate Change Management

Although there are no specific provisions for management of climate change in LUPs within the sub-region, climate management as it relates to riparian areas and wetlands in PPH and PGH would likely be addressed through efforts to improve watershed function and health. These actions would result in improved condition and trend of riparian areas and wetlands in GRSG habitat.

Impacts from Leasable Minerals Management

Riparian areas and wetlands could potentially be impacted from activities associated with leasing of fluid minerals over the majority of the planning area including PPH and PGH. Stipulations added to leases would reduce impacts. Exceptions to this could occur with newer LUPs which contain some provisions for modifying or waiving lease stipulations in cases where the resource either does not exist or where some type of mitigation can protect the resource.

Impacts from Locatable and Salable Minerals Management

Under Alternative A, riparian areas and wetlands throughout GRSG habitat are subject to impacts from locatable minerals management with limited exceptions (exceptions include areas either withdrawn or segregated from mineral entry). The requirement for BLM and the Forest Service to prevent undue and unnecessary degradation results in impacts on riparian areas being reduced, avoided, or mitigated where possible and feasible.

The majority of PPH and PGH within the planning area is also open to salable minerals management with few exceptions (these include areas with special designations or administrative

needs). Measures developed through the NEPA process would reduce, avoid, or mitigate impacts on riparian areas as applicable.

Impacts from Land Uses and Realty Management

Under Alternative A, ROW/SUA avoidance and exclusion areas make up a relatively small percent of PPH or PPG within the planning area. Consequently, only limited areas of wetland and riparian habitats are protected from disturbance. Important wildlife habitats, including riparian areas, are generally not identified for disposal under Alternative A.

Impacts from Renewable Energy Management (Geothermal only)

Impacts on riparian areas and wetlands from geothermal energy development would be the same as those described for Fluid Minerals.

Impacts from Comprehensive Travel and Transportation Management

Impacts on riparian areas and wetlands from CTTM under Alternative A would be mostly negative since the majority of PPH and PGH is designated as open. Where more restrictive designations have been established under newer plans or on Forest Service-administered lands, impacts on riparian areas would be reduced or eliminated.

Impacts from Recreation Management

Impacts on riparian areas and wetlands from CTTM under Alternative A would be mostly negative since the majority of PPH and PGH within the sub-region is open to recreation with few restrictions. Stipulations added to SRU permits may reduce impacts on riparian habitats.

4.5.5. Alternative B

Management under Alternative B would reduce land disturbances and would result in fewer impacts on riparian areas and wetlands associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Management under Alternative B would identify 12,693,500 acres for PPMAs and 5,039,400 acres for PGMA. Protecting GRSG habitat would result in few land disturbances and could result in reduced impacts on riparian habitats. Measures may also include protecting existing riparian areas and associated water sources from future use. Management under Alternative B could result in fewer impacts on riparian and wetland resources than Alternative A.

Impacts from Water Resources Management

Management under Alternative B would identify actions such as designing new range improvements to conserve, enhance or restore GRSG habitat, and using RDFs to mitigate potential impacts due to West Nile virus when developing or modifying water developments. This could result in fewer impacts on riparian habitats than Alternative A.

Impacts from Vegetation Management

Same as Alternative A.

Impacts from Riparian Areas and Wetland Management

Under Alternative B, riparian habitats are managed primarily through proposed changes to livestock grazing management. These changes would improve condition and trend of riparian areas and wetlands in PPMAs and PGMAs within the sub-region.

Impacts from managing riparian areas and wetlands for reference state vegetation relative to ecological site descriptions are not completely clear. ESDs have not been developed for lotic or lentic riparian areas although draft guidelines for development have been issued by the NRCS for lotic areas (NRCS 2011). In addition, managing for proper functioning condition of lentic riparian habitats may not be clearly tied to managing for diverse forb species richness. Some lentic sites including seeps, springs and wet meadows tend to become increasingly dominated by such species as Nebraska sedge as functioning condition improves. Disturbance such as that created by livestock grazing may be required to increase forb diversity (note that forb diversity on meadows can increase with grazing). Lotic riparian systems are also generally highly dynamic and periodic disturbance is part of how these systems function. Generally, however, managing riparian areas for proper functioning condition would result in elevated water tables and an outward expansion of mesic areas creating both more edge and more ecotones for forb diversity.

Impacts from Livestock Grazing Management

Livestock grazing would continue to be managed under existing policies and regulations as described for Alternative A for both the BLM and Forest Service. Riparian areas and wetlands including wet meadows are currently being managed for proper functioning condition and/or good ecological conditions on both BLM-administered and Forest Service-administered lands. In addition, no additional acres would be closed to livestock grazing in PPMAs and PGMAs. Recommendations for changing livestock grazing practices to meet GRSG habitat needs are the same as those currently provided for under Alternative A (and as discussed under Nature and Type of Effects, above). Generally, these include implementing changes in timing and intensity of use, numbers and distribution of livestock and in class of livestock.

Differences between Alternative B and Alternative A relative to riparian areas are focused on integrating GRSG needs into grazing plans, term grazing permits, land health assessments, and drought condition evaluations. Emphasis is also placed on integrating private lands into the planning process. Management actions under Alternative B would include establishment of specific objectives for riparian areas and wetlands based on ecological site descriptions and identified GRSG habitat needs.

Management under Alternative B would also differ from Alternate A in regards to range improvements. New water developments in PPMAs would only be allowed if the project benefited the GRSG (no changes in requirements are proposed for PPG). New required design features would be recommended for construction of ponds (including ponds or reservoirs constructed for livestock water) to reduce mosquito production and decrease opportunities for transmission of West Nile Virus. Finally, management under Alternative B would provide for evaluation and modification of existing water developments to benefit GRSG. Currently, there are no specific requirements to identify and remediate poorly designed or constructed developments which may be impairing riparian and wetland habitats.

Condition and trend of riparian areas and wetlands in PPMAs and PGMAs is expected to improve under Alternative B as a result of an increased focus on managing livestock grazing for late brood-rearing habitat. Proposed changes for range improvements under Alternative B would also

benefit riparian areas and wetlands currently being damaged by nonfunctional or improperly installed water developments. Adopting required design features for ponds is not likely to appreciably impact riparian areas and wetlands, while restricting new water developments in PPMAs could reduce opportunities for better control and management of livestock.

Impacts from Fire and Fuels Management

Management under Alternative B would not specify any specific numbers of acres for hazardous fuels management nor does it specify suppression activities. It does identify RDFs for fire suppression activities, general actions for pre- and post-fire treatment activities, timing of treatments, resting, and use of native plants for revegetation. Based on these actions, fire and fuels management under Alternative B would result in reduced impacts on riparian habitats in comparison with Alternative A. Effects of fire on riparian habitats are determined largely by habitat conditions at the time of the fire, post-fire management practices, the severity of the fire, suppression tactics used for fire management, and post-fire precipitation regimes. Hazardous fuels treatments would result in an overall decrease in wildfire potential, thereby decreasing impacts on riparian habitats.

Impacts from Wild Horse and Burro Management

Areas managed for wild horses and burros (HMAs and WHBTs) would not change from Alternative A. In addition, these areas would continue to be managed to meet AMLs and to achieve a natural ecological balance with respect to other uses. However, under Alternative B, gathers would be prioritized in PPMAs (where feasible) and GRSG habitat objectives would be incorporated into BLM HMAs and Forest Service territories. Any structural improvements proposed for horses including water developments would be subject to consideration of impacts on GRSG.

Prioritization of gathers in PPMAs could result in improved condition and trend of riparian areas and wetlands under Alternative B; however, factors outside control of the agencies may limit the implementation of this measure (refer to **Section 4.5.1**, Methods and Assumptions, for Riparian Areas and Wetlands).

Impacts from Climate Change Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Under Alternative B, 13,068,000 acres would be managed as closed and 4,664,700 acres would be managed as open to fluid minerals, oil and gas, and geothermal within PPMA and PGMA. In addition, Alternative B would identify actions and conservation measures for areas that are already leased. Management under Alternative B would result in fewer impacts on riparian habitats than Alternative A.

Impacts from Locatable Minerals Management

Management under Alternative B would identify 13,068,000 acres as petitioned for withdrawal from mineral entry and 4,664,700 acres as open to locatable mineral exploration or development within PPMA and PGMA. All locatable mineral activities would continue to be managed under the regulations at 43 CFR 3800 through the approval of a Notice of Intent or a Plan of Operations. Withdrawing important GRSG habitat from mineral entry would increase protection of riparian

habitat. It would result in fewer impacts on these areas under Alternative B in comparison to Alternative A.

Impacts from Salable Minerals Management

Management under Alternative B would identify 13,068,000 acres as closed to mineral material disposal and 4,664,700 acres as open for consideration for mineral material disposal on a case-by-case basis within PPMA and PGMA. Alternative B could result in fewer impacts on riparian habitats than Alternative A.

Impacts from Land Uses and Realty Management

Management under Alternative B would identify 4,932,400 acres as ROW/SUA avoidance, 12,693,500 acres as exclusion areas, and 233,900 acres no longer suitable for disposal. Under Alternative B, fewer acres of riparian habitats would be impacted from disturbance associated with ROWs and SUAs in comparison to Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Management under Alternative B would retain 874,000 acres as closed to motorized vehicles, 12,992,100 acres as limited to existing routes for motorized vehicles, and 3,866,100 acres as open to all modes of cross country travel. Management under Alternative B could result in fewer impacts on riparian habitats than Alternative A.

Impacts from Recreation Management

Management under Alternative B would not close any areas to recreation activities; it does specify that any SRPs must have a neutral or beneficial effect on PPMAs. Neutral or beneficial impacts on GRSG habitat result in fewer impacts on riparian habitats under this alternative compared with Alternative A.

4.5.6. Alternative C

Management under Alternative C would reduce land disturbances and would result in fewer impacts on riparian areas and wetlands associated with a particular use compared with Alternative A.

Impacts from Greater Sage-Grouse Management

Alternative C provides for extensive protection of GRSG habitat through large-scale restrictions on livestock grazing, mining, and energy development. Establishment of ACECs for GRSG is emphasized. Removing infrastructure such as fences and water developments and restoring uplands is also proposed. Collectively, these measures would improve riparian habitats through natural healing and by reducing disturbances. In comparison to Alternative A, Alternative C would result in greater improvement in condition and trend of riparian areas and wetlands.

Impacts from Riparian Areas and Wetland Management

Under this alternative, management of riparian areas and wetlands would be primarily addressed through changes in livestock management including closing PPMAs to grazing and establishing forage utilization limits in areas open to livestock. In areas closed to livestock, passive restoration (natural healing) is proposed for riparian habitats. Additional measures for riparian habitats under

Alternative C include removing existing water developments and focusing risk assessments on areas such as seeps, springs and intermittent and perennial drainages. Restrictions on ground disturbance in priority GRSG habitat would also reduce impacts on riparian areas and wetlands.

Overall condition and trend of riparian areas and wetlands in PPMAs would improve under Alternative C. Acres of riparian habitat would also increase. Many riparian areas recover rapidly once stressors are reduced or eliminated. Continuous hot season grazing by livestock creates a situation where riparian and wetland plant communities cannot recover. Under current management, many areas throughout the sub-region are grazed annually throughout the hot season. Removal of annual hot season grazing would allow for re-establishment of riparian and wetland plant communities resulting in functional floodplains and for elevated water tables, conditions leading to expansions in amount and extent of riparian habitats.

Long-term impacts of no grazing on riparian plant communities are less clear. Some studies show that plant productivity, especially in meadows, can decline over time in the absence of grazing (Bryant 1985). However, in a review of the literature on the subject, Belsky (1986) concluded that strong evidence for a positive relationship between herbivory and plant fitness is lacking (Belsky 1986). Thus, no livestock grazing would likely be positive to riparian areas and wetlands initially, but long-term impacts are less certain.

In areas outside of PPMA, a 5 percent limit on riparian browse utilization and requirement to not exceed 10 percent trampling would result in improvement in condition and trend of lotic and lentic systems where functionality is based on condition of riparian plant communities. For some systems such as marshes or boulder controlled channels, herbaceous stubble heights, and trampling limits may not be applicable.

Removal of water developments in GRSG habitat would also improve condition of riparian habitats. Increased focus on identifying and restoring riparian and wetland habitats at risk would likely increase opportunities to enhance these areas.

Impacts from Water Resources Management

Management under Alternative C would identify the removal of water developments. This would allow for further enhancement of riparian habitats and giving riparian systems the ability to recover more quickly. Management under Alternative C could result in fewer impacts on riparian habitats than Alternative A.

Impacts from Vegetation Management

Proposed reductions in livestock grazing, restoration of crested wheatgrass seedings and cheatgrass infestations, and reclamation of disturbed areas would provide an indirect benefit to riparian areas. It would do this through improved watershed function. In comparison to Alternative A, more acres of riparian areas and wetlands would improve under Alternative C.

Impacts from Livestock Grazing Management

Substantial changes in livestock management are proposed under this alternative. Removal of all grazing from PPMAs, and incorporation of stubble height, trampling, and woody browse plant utilization limits in riparian areas open to grazing would result in improvement in riparian areas and wetlands over time, at least initially. Removal of water developments would also likely improve condition of riparian areas and wetlands (see discussions above).

Areas open to livestock grazing are outside PPMAs. In these areas, actions including establishing use limits, removing range improvements, applying seasonal grazing restrictions and reducing and eliminating grazing where standards are exceeded would have both direct and indirect effects on riparian areas and wetlands. Reduced impacts from livestock on riparian areas would improve condition and trend of riparian areas. It should be noted, however, that reductions in numbers of livestock without changing season of use is unlikely to be effective. Also, a loss of management flexibility could preclude development of collaborative watershed partnerships and site-specific grazing systems designed to benefit riparian areas in PPMAs.

Impacts from Fire and Fuels Management

Same as Alternative A.

Impacts from Wild Horse and Burro Management

Impacts from this alternative would be similar to Alternative B (wild horses and burros would continue to be managed under existing regulations with the exception that GRSG needs would be considered as part of the process). In addition, use of helicopters for gathers would be precluded. Water trapping would be conducted as an alternative. Water trapping could cause trampling and loss of riparian plants, while any restrictions that make gathers less effective would represent an indirect negative impact on riparian areas if horse numbers remained too high in the HMAs/WHBTs.

Impacts from Climate Change Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Impacts on riparian areas and wetlands from leasable minerals management would be reduced under Alternative C in comparison to Alternative A.

Impacts from Locatable Minerals Management

Impacts on riparian areas and wetlands from locatable minerals management would be reduced under Alternative C in comparison to Alternative A.

Impacts from Salable Minerals Management

Impacts on riparian areas and wetlands from leasable minerals management would be reduced under Alternative C in comparison to Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative C, 17,732,900 acres would be managed as exclusion areas and 331,200 acres would no longer be suitable for disposal. Management under Alternative C could result in fewer impacts on riparian habitats than Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Restricting cross-country travel and removing or closing roads in priority habitats would directly and indirectly benefit riparian areas and wetlands by reducing disturbance and improving

watershed function. These measures would improve more acres of riparian habitat in comparison to Alternative A.

Impacts from Recreation Management

Same as for Travel and Transportation, above.

4.5.7. Alternative D

Management under Alternative D would reduce land disturbances and would result in fewer impacts on riparian areas and wetlands associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Under Alternative D, 12,693,500 acres would be managed as PPMAs and 5,039,400 acres as PGMAs. It would also outline objectives for protecting and enhancing GRS habitat as well as reducing potential future disturbances. Alternative D could result in fewer impacts on riparian habitat than Alternative A.

Impacts from Water Resources Management

Management under Alternative D would identify actions including limiting the authorization of new water developments in PPMAs and PGMAs and modifications of existing developments where spring function has been impaired. Both measures would have the effect of reducing impacts on riparian habitats in comparison with Alternative A.

Impacts from Vegetation Management

Management under Alternative D would not identify any specific numbers of acres for vegetation treatment; however, it does have some general actions specifying types of treatments and timing. Based on the actions associated with Alternative D, there should be fewer impacts on riparian habitat overall than under Alternative A.

Impacts from Riparian Areas and Wetland Management

Impacts on riparian areas would be similar to Alternative B, although under this alternative, riparian areas and wetlands would receive more emphasis in the development of management actions for weed control, vegetation treatments, fuels management and water developments. As with Alternative B, riparian habitats would be managed for some level of desired ecological condition. Habitat objectives for riparian areas would also be incorporated into the permitting process for livestock grazing. Based on these measures, condition and trend of riparian areas and wetlands in PPMAs and PGMAs would improve under this alternative.

Impacts from Livestock Management

Under Alternative D, livestock grazing in PPMAs/PGMAs would continue to be managed under existing policies and regulations, including meeting rangeland health standards on BLM-administered lands and meeting utilization standards on Forest Service-administered lands. Differences from Alternative A include incorporation of GRS habitat standards for riparian areas into the grazing permitting process and adding considerations for water developments in PPMAs/PGMAs. Under Alternative D, utilization standards for riparian areas and sequential

restrictions on grazing in the following season would apply to grazing authorizations on allotments not meeting or making progress towards meeting GRSG habitat objectives. Modifying or restricting use of water developments to reduce impacts on riparian areas and wetlands in PPMAs/PGMAs is also proposed.

Proposed administration of livestock grazing on PPMAs/PGMAs under Alternative D would likely improve condition and trend of riparian areas and wetlands. Livestock grazing represents one of the most significant impacts on riparian habitats within the sub-region. Opportunities to apply site-specific and flexible riparian grazing protocols to achieve GRSG habitat objectives would continue to be available in PPMAs/PGMAs. This opportunity would continue to foster development of large-scale collaborative management efforts on both public and private lands. Where objectives and standards are not being met, the development of “fallback” measures would help to ensure condition of riparian habitats receives priority consideration as part of the livestock grazing permitting process. Currently, standards are not being met on many riparian areas and wetlands in PPMAs/PGMAs across the sub-region.

Greater emphasis on managing water developments for GRSG would also likely benefit riparian areas since many older projects are adversely impacting seeps and springs across the sub-region. However, restrictions on use of tools to improve livestock distribution could also reduce opportunities to apply landscape level management strategies.

Impacts from Fire and Fuels Management

Management under Alternative D would not specify any specific numbers of acres for hazardous fuels management. It does identify general actions for suppression activities, pre- and post-fire treatment activities, timing of treatments, resting, and use of native plants for revegetation. Based on these actions, Alternative D could have fewer impacts on riparian habitat than Alternative A.

Impacts from Wild Horse and Burro Management

Under Alternative D, greater emphasis would be placed on meeting GRSG habitat objectives, including late summer brood-rearing habitat, than currently exists. This would improve condition and trend of riparian habitats in PPMAs/PGMAs in areas managed for wild horses and burros.

Impacts from Climate Change Management

Management under Alternative D would emphasize actions that help manage potential impacts on GRSG habitat due to climate change. These actions would include restoring connectivity and habitat in fragmented areas, managing for drought, invasive species, and wildfire and implementing vegetation treatments to restore degraded areas. All of these options would help restore degraded riparian systems and improve water quality. Management under Alternative D could have fewer impacts on riparian habitat than Alternative A.

Impacts from Leasable Minerals Management

Under Alternative D, 1,670,800 acres would be managed as closed to fluid minerals, oil and gas, and geothermal and 16,061,900 acres as open to fluid minerals, oil and gas and geothermal within PPMA and PGMA. In addition, Alternative D would list stipulations for NSO in priority GRSG habitat for currently unleased areas and require site-specific conservation measures for reducing land disturbance on leased areas. Management under Alternative D would result in fewer impacts on riparian habitats than Alternative A.

Impacts from Locatable Minerals Management

Same as Alternative A.

Impacts from Salable Minerals Management

Under Alternative D within PPMA and PGMA, 17,732,900 acres would be managed as closed to mineral material disposal and 0 acres as open for consideration for mineral material disposal on a case-by-case basis. Management under Alternative D could result in fewer impacts on riparian habitat than Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative D, 17,456,300 acres would be managed as ROW/SUA avoidance, 276,600 acres as exclusion areas and 336,300 acres no longer suitable for disposal. Management under Alternative D could result in fewer impacts on riparian habitats than Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative D, 874,400 acres would be managed as closed to motorized vehicles, 16,858,200 acres as limited to existing routes for motorized vehicles and 0 acres as open to all modes of cross country travel. Alternative D could result in fewer impacts on riparian habitat than Alternative A.

Impacts from Recreation Management

Management under Alternative D would not close any areas to recreation activities; however, it does specify that any SRPs or SUAs must have a neutral or beneficial effect on priority habitat. It also specifies that no new recreational facilities would occur in PPMAs and PGMAs. Neutral or beneficial impacts and no new recreational facilities in GRSG habitat could result in fewer impacts on riparian habitat. Therefore, management under Alternative D could result in fewer impacts on riparian areas and wetlands than Alternative A.

4.5.8. Alternative E

Alternative E proposes a hierarchical decision process of avoid, minimize, and mitigate in order to achieve the goal of no net loss of occupied, suitable, and potential GRSG habitat. Management under Alternative E would also focus management strategies over more acres of GRSG habitat in Nevada than Alternative A.

Impacts from Greater Sage-Grouse Management

Management under Alternative E would not identify acreages for PPMAs and PGMAs, rather it discusses collaboration through the ecosystem council, a mitigation banking program and disturbances greater than or equal to 5 percent of 640 acres (32 acres) within Occupied/Suitable Habitat would trigger habitat evaluation and consultation with the Sagebrush Ecosystem Technical Team. If successful, innovative approaches, including use of a dedicated technical team to address GRSG habitat issues, development of a mitigation banking and credit system to offset impacts, and greater focus on collaboration across jurisdictional lines, could increase opportunities for improvement of riparian areas and wetlands in GRSG habitat than currently exist.

Impacts from Water Resources Management

Management under Alternative E would not identify any actions for managing water resources within GRSG habitat. Impacts would be the same as Alternative A.

Impacts from Vegetation Management

Strategies to improve management of upland vegetation resources under Alternative E would indirectly improve riparian and wetland habitats if successful.

Impacts from Riparian Areas and Wetland Management

Under Alternative E, management of riparian areas and wetlands within important GRSG habitat in Nevada would be emphasized through the use of the Nevada Sagebrush Ecosystem Council, the Nevada Technical Team and the Mitigation Bank Program. Enhanced coordination, project facilitation, technical assistance and use of a credit system for effective mitigation would all likely result in improvement condition and trend of riparian areas and wetlands in both PPMAs/PGMAs in Nevada as well as additional habitats in SGMAs.

Impacts from Livestock Grazing Management

Under Alternative E, livestock grazing would continue to be managed under existing policies and regulations except that additional emphasis would be placed on managing livestock grazing for enhancement of GRSG habitat in SGMAs including PPMAs/PGMAs in Nevada.

Conditions and trends for riparian areas and wetlands is expected to improve under Alternative E in comparison with Alternative A as a result of increased emphasis on collaboration and coordination across jurisdictional boundaries and as a result of developing a system to incentivize conservation practices. These strategies would likely provide additional opportunities to improve priority riparian and wetlands habitats in Nevada.

Impacts from Fire and Fuels Management

Management under Alternative E would not specify any specific numbers of acres for hazardous fuels management or post-fire rehabilitation treatments. It does identify general actions for suppression activities, particularly associated with improving initial attack suppression actions. Based on these actions, Management under Alternative E would result in fewer impacts from wildfire to riparian resources in comparison with Alternative A.

Impacts from Wild Horse and Burro Management

Impacts on riparian areas and wetlands would be the same as for Alternative A. Generally, management of wild horses for AMLs would reduce impacts on riparian areas and to livestock management fences which indirectly benefit riparian habitat management.

Impacts from Climate Change Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Management under Alternative E would not identify areas as closed or open to fluid minerals. However, the strategy to avoid, minimize or mitigate impacts on GRSG habitat under Alternative E would result in fewer impacts on riparian and wetland habitats from activities associated with mineral leasing in comparison with Alternative A. This alternative limits habitat disturbance to

not more than 5 percent per year, per 640 acres, unless habitat treatments show credible positive results, and would refer disturbance levels exceeding 5 percent per 640 acres to evaluation and consultation with the Nevada Sagebrush Ecosystem Technical Team. SGMAs apply only to lands within Nevada.

Impacts from Locatable Minerals Management

Management under Alternative E would not identify areas for petition for withdrawal from mineral entry or open to locatable mineral exploration or development. However, the strategy to avoid, minimize, or mitigate impacts on GRSG habitat under Alternative E would result in fewer impacts on riparian and wetland habitats from activities associated with hard rock mining in comparison with Alternative A.

Impacts from Salable Minerals Management

Management under Alternative E would not identify areas as closed to mineral material disposal or open for consideration for mineral material disposal. This alternative limits habitat disturbance to not more than 5 percent per year, per 640 acres, unless habitat treatments show credible positive results, and would refer disturbance levels exceeding 5 percent per 640 acres to evaluation and consultation with the Nevada Sagebrush Ecosystem Technical Team. SGMAs apply only to lands within Nevada. This would result in fewer impacts on riparian and wetland habitats in comparison with Alternative A.

Impacts from Land Uses and Realty Management

Management under Alternative E would not identify areas for ROW/SUA exclusion, ROW/SUA avoidance, or areas available for disposal; rather this alternative proposes a strategy to avoid disturbances and development in occupied, suitable, and potential GRSG habitat. If successful, impacts on to riparian and wetland habitats from land uses and realty actions under Alternative E would be less than for Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Management under Alternative E would not identify areas as closed to motorized vehicles, or as limited to existing routes for motorized vehicles or as open to all modes of cross country travel. However, this alternative proposes a strategy to avoid disturbances and development in occupied, suitable and potential GRSG habitat. If successful, impacts on riparian and wetland habitats from travel and transportation activities under Alternative E would be less than for Alternative A. Impacts would be the same as Alternative A.

Impacts from Recreation Management

Management under Alternative E does not identify areas as closed to recreational use or specify any conservation measurements associated with recreation. However, a number of strategies to reduce potential impacts on GRSG habitats from recreation are proposed. These include avoiding, minimizing and mitigating impacts; initiating studies to evaluate impacts; and, working collaboratively across jurisdictional boundaries to resolve recreation conflicts. If successful, impacts on riparian and wetland habitats from recreation under Alternative E would be less than for Alternative A.

4.5.9. Alternative F

Alternative F is similar to Alternative B but is more comprehensive in scope. Additional restrictions on a wide range of land use activities affecting both renewable and nonrenewable resources would significantly reduce the potential to disturb riparian and wetlands habitats. In addition, designation of sagebrush reserves with further limitations on development and disturbance would result in additional protection of riparian resources. Proposed actions focused on restoration and remediation of damage or disturbance would also directly and indirectly benefit riparian areas and wetlands within the planning area. Collectively, these measures would result in more riparian and wetland habitat improvement in comparison to Alternative C.

Impacts from Greater Sage-Grouse Management

Impacts on riparian areas and wetlands are similar to Alternative B, except that there is additional emphasis on protecting priority GRSG habitat. Added focus on both preserving habitat and limiting disturbance would result in more acres of riparian and wetland habitat being improved or protected in comparison to Alternatives A and B.

Impacts from Water Resources Management

Management under Alternative F identifies no new water developments in occupied habitat unless it can be shown to benefit GRSG. It also identifies modifying or dismantling existing developments as a method to maintain the continuity of the pre-development riparian area within GRSG habitat. Management under Alternative F results in fewer impacts on riparian habitat than Alternative A.

Impacts from Vegetation Management

Increased focus on vegetation management for the benefit of GRSG habitat would indirectly benefit riparian and wetland habitat by improving overall watershed health, resulting in greater benefits to these areas in comparison to Alternative A.

Impacts from Riparian Areas and Wetland Management

Under Alternative F, riparian areas and wetlands in PPMAs/PGMAs would continue to be managed for meeting PFCs or Forest Plan standards and guidelines (refer to Alternative A). As with Alternatives B and D, riparian habitats would be managed for forb species richness, edge and potential natural communities based on ecological site descriptions. Water developments would also be limited or modified in priority GRSG habitats (refer to Alternatives B, C, and D). Additional emphasis is placed on addressing GRSG concerns and limiting land uses in priority GRSG habitat and on restricting livestock grazing practices than exists under Alternative A.

Based on similarities in impacts on portions of Alternatives A, B, C and D and on incorporation of new measures to reduce impacts on riparian habitats, condition and trend of riparian areas and wetlands in PPMAs/PGMAs would improve under Alternative F.

Impacts from Livestock Grazing Management

Under Alternative F, impacts on riparian areas and wetlands including proposed incorporating GRSG habitat objectives for late summer brood-rearing habitat into the livestock grazing permitting process and into land health assessments are similar to Alternatives B and D. Restrictions on new water developments and proposals to modify existing developments are

similar to Alternatives B, C, and D. Other measures including establishment of ungrazed reference areas, incorporation of rest requirements and adoption of restrictive utilization limits for riparian habitats are also proposed (see related proposals under Alternative C).

Condition and trend of riparian habitats would likely improve under Alternative F as a result of placing greater emphasis on livestock impacts on late summer brood-rearing habitat (refer to discussions under Alternatives B and D). Establishment of ungrazed reference areas may result in expansion of riparian areas at least initially (see related discussion for removing livestock use from PPMAs/PGMAs under Alternative C). Although ungrazed areas, especially riparian habitats, could become less productive over time, reference areas would provide a comparison to grazed areas and more conclusive results about the effectiveness of this strategy.

The establishment of strict utilization limits (less than or equal to 25 percent of annual use) for riparian habitats may limit flexibility to achieve landscape-level grazing prescriptions. The utilization limit along with a rest requirement (25 percent of grazed area to be rested annually) is proposed in addition to use of established protocols for riparian grazing management including the control of frequency, timing and duration of use. Although riparian areas and wetlands would improve in PPMAs/PGMAs on public lands under such restricted grazing, opportunities to develop collaborative riparian grazing systems across jurisdictional and land ownership boundaries would be more limited under this alternative than for Alternatives A and E.

Impacts from Fire and Fuels Management

Same as Alternative B.

Impacts from Wild Horse and Burro Management

Impacts on riparian areas and wetlands are similar to Alternatives A, B, and D. Wild horse and burro AMLs would be reduced by 25 percent within HMAs/WHBTs with occupied GRSG habitat. While impacts from wild horses and burros would remain, this would reduce the effects of wild horses and burros described under Alternatives A, B, and D. More emphasis would also be placed on meeting GRSG habitat needs including late summer brood-rearing habitat in herd management areas than currently exists.

Impacts from Climate Change Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Same as Alternative B.

Impacts from Locatable Minerals Management

Same as Alternative B.

Impacts from Salable Minerals Management

Same as Alternative A.

Impacts from Land Uses and Realty Management

Same as Alternative B.

Impacts from Comprehensive Travel and Transportation Management

Alternative F is similar to Alternative B, with the exception that there would be increased focus on planning and on closing or remediating roads in priority habitat. These measures would reduce impacts on riparian areas and wetlands in comparison to Alternatives A and B.

Impacts from Recreation Management

Management under Alternative F would not close any areas to recreational activities; it does specify that any BLM SRPs or Forest Service SUAs must have a neutral or beneficial effect on priority habitat. It also specifies that timing of certain recreational activities and prohibits cross-country travel in priority GRSG habitat. Neutral or beneficial impacts and no cross-country travel in GRSG habitat could result in fewer impacts on riparian habitats in comparison to Alternative A.

4.6. Special Status Species

Implementing the management actions for GRSG described in **Table 2-5**, Description of Alternative Actions, would have mostly negligible or beneficial impacts on other special status species and, therefore, impacts from each alternative are not discussed separately in detail. See Biological Evaluation (**Appendix J**, Management Indicator Species Report) for further discussion of effects of management actions on other special status species.

Most of the management actions for GRSG under the Alternatives would be beneficial for the majority of sensitive species inhabiting in the planning area. The possible exception would be species that require pinyon and juniper woodlands for at least part of their life cycle requirements. Pinyon and juniper woodlands include pure to nearly pure stands of single-leaf pinyon pine and any of four species of junipers – Utah, Western, Rocky Mountain, or California (NDOW 2013). Physical features of pinyon and juniper woodlands are highly variable, even within a single mountain range. Pinyon and juniper woodlands on unproductive soils provide a variety of sheltering functions for wildlife that range from hiding cover to cavities and nest sites for birds, bats and small mammals. As an evergreen cover, such habitat provides important thermal protection for wildlife during winter and shelter from the summer's intense sun.

Two critical services of pinyon and juniper habitat to wildlife are structure and the pinyon nut crop. Ferruginous hawks exploit pinyon and juniper woodlands by relying on older trees of sufficient size and structure to support their large nest platforms, but these trees must be located at the lower edge of the forest or on upper slopes of drainages where they provide a long view of the surrounding, open sagebrush expanses where prey dwell. For birds and bats in particular, pinyon and juniper woodland provide structure for nesting and roosting, and locations for foraging that would otherwise be missing from the mid-elevation cold desert were it dominated by shrubs. Pinyon Jays and small mammals are strongly tied to the annual pinyon nut crop.

The BLM and Forest Service acknowledge the requirements of pinyon and juniper obligate species may be contradictory to the restoration of sagebrush habitat for GRSG, but management decisions would need to be made on a more local case-by-case basis and therefore is not further discussed in this programmatic document.

4.7. Wild Horses and Burros

4.7.1. Methods and Assumptions

Indicators

Indicators of impacts on wild horse and burro management are as follows:

- Changes to HMAs/WHBTs AMLs in GRSG habitat.
- Changes in ability to provide long-term management of wild horses and burros in HMAs/WHBTs due to changes in forage availability, and sufficient volume, quality and distribution (location) of water sources.

Assumptions

The analysis includes the following assumptions:

- Designated HMAs/WHBTs to meet the four-season habitat needs and allow for a self-sustaining herd at a designated AML.
- Horses and burros are dependent on the herbaceous component of a shrub/grass plant community. Encroachment of shrubs or pinyon-juniper onto established range lands are adverse, increases in grasses and forbs are beneficial. Vegetation treatments such as prescribed burns or weed control can enhance the plant community composition and forage availability.
- Heavy or poorly timed grazing will adversely affect plant composition, plant succession, and ground cover.
- Water is the primary resource associated with wild horse distribution. Water developments can improve wild horse distribution. Furthermore, man-made water developments that employ some type of mechanical device (e.g., windmill, electric pump, etc.) can fail and cause horses to go without or go elsewhere for water.
- Fences and other disturbances can restrict wild horse movement and access. Fences are sometimes necessary to restrict horse distribution to areas inside HMAs/WHBTs or to protect sensitive resources within HMAs/WHBTs.
- While wild horses and burros may be found on lands outside HMAs/WHBTs, these areas have no forage allocated to wild horses and burros and BLM/Forest Service has no authority to manage (except to remove) wild horses and burros outside of HMAs/WHBTs.
- Wild horse and burro gather operation scheduling is a product of a national priority process. Factors affecting gather priorities include determinations of excess horses and overpopulations, wild horse and range condition, annual appropriations, litigation and court orders, emergency situations (i.e., disease, weather, fire, etc.), availability of contractors, adoption market, and long-term holding availability for unadoptable excess horses.
- 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.

- Wild horse and burro distribution will and can vary by season, climatic conditions, water and forage availability, and population size.

Intensive livestock grazing management strategies (scheduled pasture rotations) that involve project infrastructure (fences) are generally not appropriate for long-term wild horse management.

4.7.2. Nature and Type of Effects

Within the sub-region, all BLM and Forest Service districts manage for wild horses and burros within established HMAs (BLM) or WHBTs (Forest Service). Most HMAs or WHBTs contain GRSG habitat within a sagebrush vegetation community. Overall management direction is to manage for healthy populations of wild horse and burros to achieve a thriving natural ecological balance with respect to wildlife, livestock use, and other multiple uses. All HMAs/WHBTs are managed for AML. Initially, AML is established in LUPs at the outset of planning and is adjusted based on monitoring data throughout the life of the plan. Priorities for gathering excess wild horses and burros to maintain AML are based on population inventories, resource monitoring objectives, gather schedules, and budget. Gathers are also conducted in emergency situations when the health of the population is at risk due to lack of forage or water and in some situations, wildland fire. Direction for prioritizing wild horse and burro gathers for maintaining AML is not based on GRSG habitat needs, although this is implicit in the Congressional directive to maintain a thriving natural ecological balance. Under the No Action Alternative, there are no goals, objectives, or management actions specifically identified within the management framework for the Wild Horse and Burro program.

Implementing management for the protection of GRSG generally involves reducing or otherwise restricting land uses and activities that could potentially reduce forage and water availability or disturb a wild horse and burro population. For example, mineral extraction, recreation and construction activities within ROW grants may all reduce forage availability, result in disturbance or prohibit the ability of wild horses and/or burros to move freely across HMAs/WHBTs. Protecting areas from these activities for the purpose of protecting GRSG would also protect forage for wild horse and burros and limit disturbance (human and surface). Impacts could occur to wild horse and burros and the ability to support AMLs when management options for HMAs/WHBTs are restricted. For example, establishment of priority for gather operations in PPMAs could put HMAs/WHBTs that do not contain PPMAs at risk for overpopulation; however, provisions under this plan would allow for exceptions as needed for herd health limiting impacts. Impacts from range improvement restrictions would generally vary based on type of range improvement affected; restrictions on fences would improve wild horse habitat by allowing free range, while limitations on projects that could enhance forage and water availability would not help to support the AML.

Implementing management for the following resources would have negligible or no impact on wild horse and burro management, and are therefore not discussed in detail: air quality, visual resources, cultural resources, ACECs, socioeconomics, and tribal interests.

4.7.3. Impacts Common to All Alternatives

Impacts from Wild Horse and Burro Management

Across all alternatives, the number of acres of habitat affected would be the same. Impacts from wild horse and burro populations would be the same as identified in the individual LUP analysis.

Wild horse and burro grazing has similar impacts as livestock grazing in their effect on soils, vegetation health, species composition, water, and nutrient availability by consuming vegetation, redistributing nutrients and seeds, trampling soils and vegetation, and disrupting microbial systems as identified in Connelly 2004.

4.7.4. Alternative A

Impacts from Greater Sage-Grouse Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Vegetation and Soils Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Livestock Grazing Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Fire and Fuels Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Wild Horse and Burro Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Climate Change Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Leasable Minerals Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Locatable and Salable Minerals Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Land Uses and Realty Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Renewable Energy Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Recreation Management

Under Alternative A, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

4.7.5. Alternative B

Impacts from Greater Sage-Grouse Management

Protections afforded to GRSG and its habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with priority GRSG habitats.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Use of management prescriptions to conserve, enhance, or restore riparian areas and wet meadows within GRSG habitat could also benefit wild horses and burros. Management techniques such as fencing could also limit wild horse and burro access to riparian areas and reduce water availability resulting in potential need for reduction of wild horse and burro numbers within an HMA/WHBT.

Impacts from Vegetation and Soils Management

Allowance of vegetation treatments designed to conserve, enhance, or restore GRSG habitat would also benefit wild horses and burros.

Impacts from Livestock Grazing Management

Managing livestock grazing to protect and maintain priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. Allowance of management treatments designed to conserve, enhance, or restore GRSG habitat that benefit livestock would also benefit wild horses and burros. Modification or elimination of livestock watering sites could reduce water availability resulting in potential need for reduction of wild horse and burro numbers within an HMA/WHBT.

Impacts from Fire and Fuels Management

Fuels projects that protect existing sagebrush ecosystems and associated priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. However, temporary or long-term management changes to wild horses and burros

(i.e., reduction in AML, removals, movement patterns, forage access, etc.) may be necessary to achieve and maintain the desired project objectives.

Prioritizing fire suppression activities to conserve priority GRSG habitat would also benefit wild horse and burro habitat.

Impacts from Wild Horse and Burro Management

Managing wild horse and burro populations and their habitat to protect and maintain priority GRSG habitat could be expected to impact wild horses and burros whose HMAs/WHBTs overlap with these habitats. Prioritizing wild horse and burro gathers to those HMAs/WHBTs and areas outside of established boundaries that overlap priority GRSG habitat could impact population management activities within non-GRSG HMAs/WHBTs. Modification or elimination of watering sites in order to conserve GRSG habitat could reduce water availability resulting in potential need for reduction of wild horse and burro numbers within a HMA/WHBT. Prioritizing the evaluation of AMLs and completing land health assessments may result in need for the reduction of wild horse and burro numbers within and outside HMA/WHBT in order to achieve GRSG habitat objectives.

Impacts from Climate Change Management

Under Alternative B, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Leasable Minerals Management

Leasing and surface occupancy restrictions to protect and maintain priority GRSG habitat along with reduction of disturbance (human and surface) would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

Impacts from Locatable and Salable Minerals Management

Withdrawals and closures of priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Land Uses and Realty Management

Implementation of exclusion and avoidance actions as well as limiting surface disturbance in order to protect and maintain priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. Retention of priority GRSG habitat would also benefit wild horse and burros.

Impacts from Renewable Energy Management

Under Alternative B, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Comprehensive Travel and Transportation Management

Restrictions to travel and surface disturbance to protect and maintain priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Recreation Management

Under Alternative B, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

4.7.6. Alternative C

Impacts from Greater Sage-Grouse Management

Protections afforded to GRSG and its habitat would be expected to benefit and impact wild horse and burro populations.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Restoration of riparian areas would benefit wild horse and burro populations through water availability and improved habitat condition. Establishing riparian stubble height limitations would require reducing utilization levels which would likely result in need for reduction of wild horse and burro AML for the HMA/WHBT. Elimination of livestock water developments could reduce water availability within an HMA/WHBT resulting in potential need for reduction of wild horse and burro numbers.

Impacts from Vegetation and Soils Management

Under Alternative C, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Livestock Grazing Management

Elimination of livestock grazing within SRAs and reducing grazing levels within those areas that retain grazing use to protect and maintain occupied GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. Establishing upland and riparian stubble height requirements that require reducing utilization levels would likely result in need for reduction of wild horse and burro AML for the HMA/WHBT. Elimination of livestock watering sites could reduce water availability resulting in potential need for reduction of wild horse and burro numbers within an HMA/WHBT.

Impacts from Fire and Fuels Management

Under Alternative C, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Wild Horse and Burro Management

Evaluation of AMLs and completing land health assessments may result in need to reduce wild horse and burro populations within an HMA/WHBT as well as outside their boundaries in order to achieve GRSG habitat needs. Restricting removal and population control techniques could hamper proper management.

Impacts from Climate Change Management

Under Alternative C, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Leasable Minerals Management

Under Alternative C, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Locatable and Salable Minerals Management

Withdrawals and targeted restoration within occupied GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these areas.

Impacts from Land Uses and Realty Management

Prohibiting new ROW corridors within ACECs and occupied habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. Retention of all public lands within ACECs and occupied GRSG habitat would also benefit wild horse and burros.

Impacts from Renewable Energy Management

Prohibiting new site development and associated ROW corridors within ACECs and occupied habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these areas.

Impacts from Comprehensive Travel and Transportation Management

Seasonal restrictions and closures within occupied GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Recreation Management

Under Alternative C, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

4.7.7. Alternative D

Impacts from Greater Sage-Grouse Management

Protections afforded to GRSG and its PPMAs or PGMA habitats would be expected to benefit wild horses and burros where HMAs/WHBTs overlap these areas.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Conservation and enhancement of riparian areas would benefit wild horse and burro populations through improved habitat condition.

Impacts from Vegetation and Soils Management

Evaluation and prioritization of GRSG habitat restoration treatments identified for PPMAs or PGMA habitat would be expected to benefit wild horse and burro habitat. Associated landscape-scale management and surface disturbance restrictions would also benefit wild horse and burro habitat.

Impacts from Livestock Grazing Management

Managing livestock grazing to protect and maintain PPMAs and PGMA habitats would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Allowance of management treatments designed to conserve, enhance, or restore PPMAs and PGMAs habitats that benefit livestock would also benefit wild horses and burros. Authorization of new or modification of existing livestock watering sites that benefit or conserve PPMAs and PGMAs habitats would be expected to benefit wild horses and burros. Elimination of existing water sources that may be identified as impacting PPMAs and PGMAs habitats could reduce water availability resulting in potential need for reduction of wild horse and burro numbers within a HMA/WHBT.

Impacts from Fire and Fuels Management

Fuels projects that protect and restore existing sagebrush ecosystems and associated PPMAs and PGMAs habitats would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Prioritization of fire suppression activities to protect and conserve PPMAs and PGMAs habitats would also benefit wild horse and burro habitat.

Impacts from Wild Horse and Burro Management

Managing wild horse and burro populations and their habitat to achieve GRSG habitat objectives within PPMAs and PGMAs habitats could be expected to impact wild horses and burros whose HMAs/WHBTs overlap with these habitats. Prioritizing wild horse and burros gathers to those HMAs/WHBTs as well as outside of these boundaries that overlap PPMAs and PGMAs habitats could impact population management activities within non-GRSG HMAs/WHBTs. Evaluation of AMLs may result in need for the reduction of wild horse and burro numbers within an HMA/WHBT in order to achieve GRSG habitat objectives.

Impacts from Climate Change Management

Management actions and treatments that enhance and sustain PPMAs and PGMAs habitats for the long term would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Leasable Minerals Management

Leasing and surface occupancy restrictions to protect and maintain PPMAs and PGMAs habitats along with reduction of disturbance (human and surface) would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

Impacts from Locatable and Salable Minerals Management

Management restrictions that conserve, maintain and enhance PPMAs and PGMAs habitats while meeting the Nation's and State's needs for these minerals would be expected to benefit wild horses and burros.

Impacts from Land Uses and Realty Management

Implementation of exclusion and avoidance actions as well as limiting surface disturbance in order to protect and maintain PPMAs and PGMAs habitats would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. Retention of these habitats would also benefit wild horse and burros.

Impacts from Renewable Energy Management

Under Alternative D, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Comprehensive Travel and Transportation Management

Restrictions and closures, both seasonal and long term, that minimize disturbances (human and surface) within PPMAs and PGMAs habitats would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

Impacts from Recreation Management

Restrictions and closures, both seasonal and long term, that minimize disturbances (human and surface) within PPMAs and PGMAs habitats would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

4.7.8. Alternative E

Impacts from Greater Sage-Grouse Management

Protections afforded to GRSG and its habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with SGMAs.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Use of management prescriptions to conserve, enhance, or restore riparian areas and wet meadows within SGMAs could also benefit wild horses and burros. Management techniques such as fencing could also limit wild horse and burro access to riparian areas and reduce water availability resulting in potential need for reduction of wild horse and burro numbers within a HMA/WHBT.

Impacts from Vegetation and Soils Management

Under Alternative E, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Livestock Grazing Management

Managing livestock grazing within SGMAs to protect and maintain GRSG habitats would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Fire and Fuels Management

Fire management activities that protect, maintain, and improve sagebrush habitat would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

Prioritizing fire suppression activities to conserve GRSG habitat within SGMAs would also benefit wild horse and burro habitat.

Impacts from Wild Horse and Burro Management

Evaluation of HMA designations and their associated AMLs within SGMAs may result in need for the reduction of populations or elimination of wild horse and burro HMAs/WHBTs in order to achieve GRSG habitat objectives.

Impacts from Climate Change Management

Under Alternative E, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Leasable Minerals Management

Mining and mineral exploration activities that protect and maintain sagebrush habitat within SGMAs would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Locatable and Salable Minerals Management

Mining and mineral exploration activities that protect and maintain sagebrush habitat within SGMAs would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Land Uses and Realty Management

Implementation of avoidance actions for locating ROWs and facilities in order to protect and maintain GRSG habitat within SGMAs would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Renewable Energy Management

Implementation of avoidance actions as well as limiting disturbances (human and surface) within SGMAs would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these areas.

Impacts from Comprehensive Travel and Transportation Management

Travel restrictions, both seasonal and long-term within SGMAs, which minimize disturbances (human and surface) to GRSG, would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

Impacts from Recreation Management

Actions that avoid, minimize and mitigate disturbance within SGMAs could be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these areas.

4.7.9. Alternative F

Impacts from Greater Sage-Grouse Management

Protections afforded to GRSG and its habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with PPMAs or PGMAs.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Use of management prescriptions to conserve, enhance, or restore riparian areas and wet meadows within GRSG habitat could also benefit wild horses and burros. Modification or elimination of livestock watering sites could reduce water availability resulting in potential need for reduction of wild horse and burro numbers within a HMA/WHBT.

Impacts from Vegetation and Soils Management

Vegetation treatments designed to conserve, enhance, or restore GRSG habitat would also benefit wild horses and burros.

Impacts from Livestock Grazing Management

Managing livestock grazing to protect and maintain priority GRSG habitat would be expected to benefit wild horse and burro habitats. Prioritization of the completion of land health assessments may result in the need to reduce wild horse and burro numbers within a HMA/WHBT in order to achieve GRSG habitat needs. Establishing upland and riparian utilization levels limits in order to achieve GRSG habitat objectives would likely result in the need for the reduction of wild horse and burro AML for the HMA/WHBTs that overlap the area. Elimination or modification of livestock watering sites could reduce water availability resulting in potential need for reduction of wild horse and burro numbers within a HMA/WHBT.

Impacts from Fire and Fuels Management

Fuels treatments that protect existing sagebrush ecosystems and associated priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats. However, temporary or long-term management changes to wild horses and burros (i.e., reduction in AML, removals, movement patterns, forage access, etc.) may be necessary to achieve and maintain the desired project objectives.

Prioritizing fire suppression activities to protect and conserve priority GRSG habitat would also benefit wild horse and burro habitat.

Impacts from Wild Horse and Burro Management

Managing wild horse and burro populations and their habitat to protect and maintain priority GRSG habitat could be expected to impact wild horses and burros whose HMAs/WHBTs overlap with these occupied habitats. While impacts from wild horses and burros would remain, reducing wild horse and burro AMLs by 25 percent would reduce the effects of wild horses and burros, as described under Alternative A. As a result, costs of wild horse and burro management would increase, due to a need for additional horse gathers for removal and population growth suppression treatment to attain and maintain the newly established AMLs. Reductions to this level could impact herd sustainability and diversity, which could lead to changes in HMA/WHBT designation and long-term management in these occupied habitats.

Prioritizing wild horse and burro gathers to those HMAs/WHBTs as well as outside their boundaries that overlap priority GRSG habitat could impact population management activities within non-GRSG HMAs/WHBTs. Modification or elimination of watering sites could reduce water availability resulting in potential need for reduction of the wild horse and burro population within a HMA/WHBT. More residual grasses and forbs would likely remain in the occupied GRSG habitat that overlaps HMAs/WHBTs. Prioritizing the evaluation of AMLs, HMA designations, and completing land health assessments may result in need for the reduction or elimination of wild horse and burro populations within a HMA/WHBT in order to achieve GRSG habitat objectives.

Impacts from Climate Change Management

Under Alternative F, the impacts on wild horse and burro management would continue to be the same as those identified in the individual LUP documents.

Impacts from Leasable Minerals Management

Leasing and surface occupancy restrictions and closures to protect and maintain priority GRSG habitat along with reduction of disturbance would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats.

Impacts from Locatable and Salable Minerals Management

Withdrawals and closures of priority GRSG habitat would be expected to benefit wild horses and burros and their habitat.

Impacts from Land Uses and Realty Management

Implementation of exclusion and avoidance actions as well as limiting disturbance (human and surface) in order to protect and maintain priority GRSG habitat would be expected to benefit wild horses and burros whose HMAs/WHBTs overlap with these habitats. Retention of priority GRSG habitat would also benefit wild horse and burros.

Impacts from Renewable Energy Management

Closure of priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Comprehensive Travel and Transportation Management

Restrictions to travel and surface disturbance to protect and maintain priority GRSG habitat would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

Impacts from Recreation Management

Seasonal camping and non-motorized recreation closures near active leks as well as prohibition of off-road vehicle use in PPMAs would be expected to benefit wild horses and burros where HMAs/WHBTs overlap with these habitats.

4.8. Wildland Fire and Fire Management

4.8.1. Methods and Assumptions

Indicators

Indicators of impacts on wildland fire ecology and management are as follows:

- Alteration of vegetative cover is likely to result in a shift in FRCC.
- A change in the likelihood of human-caused wildfire in the planning area.
- A change in the size, extent, or occurrence of wildfire in the planning area.
- Management actions that inhibit a response to wildland fire or appropriate treatments to prevent wildland fire.

Assumptions

The analysis includes the following assumptions:

- Fire is an important functional, natural disturbance in many of the ecological systems found in the planning area.
- A direct relationship exists between fuel characteristics and potential fire intensity and severity.
- Necessity for fuels treatments would likely increase over the life of this plan.

There will be increased demand on suppression resources managing wildland fires to protect values at risk.

4.8.2. Nature and Type of Effects

Impacts on wildland fire management result from changes in fire frequency and intensity, and the ability to employ fire-suppression methods, all of which would affect management of fire and related costs within the planning area. Actions which change fire regime condition class from highly altered ecosystems could reduce the risk of losing key ecosystems as well as decrease fire risk and management costs in the long term.

Many different resource uses may introduce additional ignition sources into the planning area, which increase the probability of wildfire occurrence and the need for fire-suppression activities. Fire intensity can be affected by activities that decrease fuel loading, such as vegetation treatments and harvesting of timber products, and activities that alter the composition and structure of vegetation communities. High-intensity fires generally result in a greater loss of vegetation cover, changes to soil chemistry, damage to root structures, and a greater ability for non-native species to become established (Verma and Jayakumar 2012).

Surface disturbance produced would generally contribute to the modification of the composition and structure of vegetation communities (including an increase in invasive and noxious weed proliferation). This proliferation could then likely cause the potential for increased fire spread and activity. Therefore, management actions that minimize disturbance for GRSG would reduce the potential risk of fire.

Management actions that are intended to improve, create, or re-establish healthy ecological conditions in various vegetation types benefit the fire and fuels program in the long term by promoting the most efficient use of fire and fuels management program resources. In addition, allowing a range of fuel treatment options and providing the possibility to use unplanned wildfire to meet land management plan objectives where appropriate provides needed management flexibility to reduce large fire costs and achieve fire and fuels goals and objectives. However, prioritizing fire suppression can limit management options and increase costs for fire management programs. Riparian and water resource management could restrict suppression operations by limiting use of heavy equipment or retardant near streams or riparian areas.

Wild horse and burro grazing can impact the BLM's ability to manage fires as a natural process due to grazing's influence on fine fuels availability (e.g., perennial grasses). A reduction or change in AML can in turn change the fine fuels in site-specific locations. The impact would be the greatest where fine fuels are the primary fire carrier.

Fire management may be impacted from climate change trends in the planning area. Generally, increased temperature and longer growing seasons may result in more rapid accumulation of fuels in forested and montane shrubland systems (Brown et al. 2004). This increase of fuel loading would increase the FRCC departure, effecting the fire size, intensity and severity resulting in an increase in fire suppression costs, fuels treatment planning and implementation.

In the same forested and montane shrublands, climate change may increase the frequency and duration of droughts increasing fire frequency (Brown et al. 2004). The increased temperatures and longer growing season will also support the expansion of invasive annual grasses and forbs. This effect will also increase fire frequency and extent which will then promote the onslaught of invasive annual grasses. This positive feedback loop of fire and invasive plant species may be the greatest impact on fire management and GRSG (Abatzoglou and Kolden 2011).

Transportation and travel management affects wildland fire in three main ways: 1) by providing access for fire suppression, 2) by providing an avenue for noxious weed and invasive plants spread, and 3) by providing access for increased human activities, which can lead to human-caused fires. Roads and trails that are maintained, repaired, or open for public use generally remain in a passable condition that allows access for fire suppression equipment and manpower, and they can also be used as control lines. This improved access results in faster response times leading to reduced fire size.

Roads and trails are one of the main vectors of weed spread, which leads to an increase in FRCC and ecosystems moving away from natural fire regimes (CEC 2012). This is compounded by open OHV use and increased human use increases the potential for human-caused fire ignition. Similarly, the level and type of recreation permitted can impact fire risk. Increased recreational use may increase the probability of unintentional fire starts from human-caused ignitions and the need for fire suppression. **Table 4-27**, Human-Caused Fires in GRSG Habitat (1992-2011), displays the number of human caused points of ignition with a one mile buffer within GRSG habitat within the planning area from 1992 – 2011.

Table 4.28. Human-Caused Fires in GRSG Habitat (1992-2011)

Human Caused Fires	Acres	% of Acres by Type	Starts	% of Starts by Type
Miscellaneous	75,866	24.87%	322	25.35%
Equipment Use	104,303	34.19%	255	20.08%
Not Specified	10,164	3.33%	212	16.69%
Debris Burning	39,611	12.98%	158	12.44%
Arson	26,227	8.60%	113	8.90%
Campfire	35,176	11.53%	110	8.66%
Railroad	13,219	4.33%	48	3.78%
Children	366	0.12%	27	2.13%
Smoking	144	0.05%	25	1.97%
Grand Total	305,076	100.00%	1270	100.00%

Source: Short 2013; BLM and Forest Service 2013

Surface disturbance caused by development would generally contribute to the modification of the composition and structure of vegetation communities (including increases in noxious weed proliferation) in the vicinity of developed areas, which could then be more likely to fuel high-intensity fires. This could cause an increase in program costs because of the increased potential for fire.

Lands and realty actions may indirectly result in increased fire risk potential. For example, issuance of ROWs can result in indirect impacts by increasing the risk of human-caused ignition should construction of transmission lines, renewable energy projects, or other development occur. Limiting ROW grants may reduce roads and in turn reduce potential fire suppression control lines. Fire suppression response times could also increase over time where limitations on new road construction restrict access. Limiting ROW grants and SUAs could decrease the potential for utilizing roads as fuel breaks and control lines during fire suppression.

Likewise, the development of energy and minerals resources increases the risk of wildfires by introducing new ignition sources (Shlisky et al. 2007). Associated facilities, infrastructure and transmission lines can increase fire and fuels program costs while decreasing fire management flexibility with regards to suppression options. Energy development also poses hazards to firefighters, including unknown toxins, facility protection, evacuation of industry personnel, and dangerous overhead power lines. Fire programs could incur additional costs to train firefighting personnel for emergency situations associated with energy development. Additional limitations on mineral development would have an indirect effect of decreased fire. This would be due to less development, fewer vehicles, and less construction equipment, all of which would serve to decrease the chance of human ignition. Development of federal minerals underlying non-federal surface ownership may impact fire management on BLM-administered lands, particularly when ownership is in a checkerboard pattern, as fires ignited on non-federal lands may quickly spread onto and impact BLM-administered lands.

The additional closure to mineral material disposal infrastructure supporting minerals development would decrease accessibility to remote areas for fire suppression and would reduce fuel breaks in the event of wildfire.

The potential for invasive species establishment or increase may follow construction and could impact fire management actions through increased risk of fire and need for fire management.

Range grazing management can impact the ability to manage fire as a natural process through changes in fine fuels availability (e.g., grasses). Livestock grazing reduces fuel loads, so a reduction in grazing intensity or change in grazing location may lead to changes in fuel levels at site-specific locations.

Vegetation and weed treatments that decrease standing vegetation could decrease the intensity of wildland fires and allow fires to be more easily controlled. For example, efforts to reduce incursion of nonnative annual grasses (primarily cheatgrass) and proliferation of other noxious and invasive weeds would promote healthy plant communities and lower risk of high-intensity wildfire (USGS 2006c). Used appropriately, prescribed fire would be compatible with noxious weed control; however, the presence of noxious weeds and the potential of weeds to spread after a prescribed fire would need to be monitored on a site-specific basis. However, management actions that retain shrub and cover may result in increased fuel loading and increase the likelihood and intensity of wildland fire.

Special designations such as ACECs and the management of sensitive resources can restrict fuels treatments on a site-specific basis. For example, in areas where preservation of particular species or habitats is emphasized, management options and fuels treatments may be limited.

Implementing management for the following resources would have negligible or no impact on wildfire and fire management and are therefore not discussed in detail: Air Quality, Soil Resources, Fish and Wildlife, Cultural Resources, and Visual Resources.

4.8.3. Impacts Common to All Alternatives

Impacts from Vegetation and Soils Management

Downward Shift in Fire Regime Condition Class

Creating landscapes that benefit GRSG through the use of restoration projects would improve FRCC. The several aspects of restoration may create this benefit by reducing the infestation of cheatgrass and other non-natives that can alter fire frequency. Restoration may also reduce mid to late seral encroachment of sage steppe by pinion juniper. Removing encroaching conifers could reduce fire intensity and fire potential and improve FRCC.

While GRSG restoration will affect FRCC, the area's most likely to benefit GRSG might not relate to the areas that would most likely benefit FRCC and hazardous fuels reduction. Furthermore, landscape patterns that most benefit GRSG may be more prone to wildfire due to lack of disturbance and in early seral areas. Completed restoration projects may further increase the suppression priority of that area, increasing demands for fire suppression resources.

Vegetation and weed treatments that decrease standing vegetation and associated fuel loads could decrease the intensity of wildland fires and allow fires to be more easily controlled. For example, efforts to reduce incursion of non-native annual grasses (primarily cheatgrass), and the proliferation of other noxious and invasive weeds, would promote healthy plant communities and an associated lower risk of high-intensity wildfire (USGS 2006c). Used appropriately, prescribed fire would be compatible with noxious weed control; however, the presence of noxious weeds and the potential of weeds to spread after a prescribed fire would need to be monitored on a site-specific basis. However, management actions that increase shrub and cover may result in increased fuel loading, which increases the intensity of wildland fire.

Management actions that are intended to improve, create, or re-establish healthy ecological conditions in various vegetation types benefit the fire and fuels program in the long term by shifting FRCC to historic conditions and promoting the most efficient use of fire and fuels fire management program resources.

Restrictions on fuels treatment could impact ability to control fuels levels and result in increased fire risk. For example: Restrictions on reduction of canopy cover could increase fuel loads and associated fire risk. Allowing a range of fuel treatment options provides management flexibility to reduce large fire costs and achieve fire and fuels goals and objectives. Prioritizing areas for fire suppression can limit management options and increase costs for fire management

Impacts from Riparian Areas, Wetlands and Water Resources Management

Riparian areas, wetlands, and water resource management could restrict suppression operations by limiting use of heavy equipment or retardant near streams or riparian areas.

Impacts from Leasable Minerals Management

Associated facilities, infrastructure and transmission lines from leasable mineral activities can increase fire and fuels program costs while decreasing fire management flexibility with regards to suppression options. Energy development also poses hazards to firefighters, from unknown toxins, facility protection, evacuation of industry personnel, and dangerous overhead power

lines. Fire programs could incur additional costs to train firefighting personnel for emergency situations associated with energy development.

Altered Project Design and Reduce Effectiveness

In areas with high potential for fluid mineral development, restricting development disturbance would generate a greater need for off-site mitigations than in lower potential areas. These mitigation actions could range from rehabilitating existing disturbances to creating additional habitat by removing other vegetation to allow for less competition for sagebrush.

Vegetation treatments used to mitigate impacts by creating or improving sagebrush areas is where the impact on wildland fire management would occur. Mitigation vegetation treatments would be placed in areas where habitat improvements are necessary and may not take into consideration other values at risk and may reduce opportunities to develop effective or strategically placed fuel projects or other vegetation treatments. Fuels projects should be placed in the best location to reduce the intervals in sagebrush. This would vary from 20 to 70 years, depending on the site and the species of sagebrush. Due to fire suppression, fire regimes and planning areas have been altered. Vegetation that has missed a fire cycle or two is decadent, with large dead components that can increase fire intensity. Range treatments in the past have created early seral vegetation that is less likely to support large wildfires and maintain FRCC.

Reducing vegetation treatments that mimic the natural fire effects has increased the FRCC of these landscapes, leaving them more prone to large intense wildfires. Vegetation treatments or fire scars scattered across the landscape can interrupt the progression of a fire, limiting the fire's size. Landscapes that do not have disturbances are prone to fires burning more acres than past wildfires did. As the overall age class of vegetation on the landscape increases, it creates an upward shift in FRCC.

While the treatments would still occur that meet GRSG objectives, they would more likely be mechanical, which can be more expensive than using prescribed fire as a treatment method. This is due to the necessity of GRSG treatments to retain minimum percent cover of sagebrush. This is more easily ensured when using mechanical treatments versus prescribed fire treatment methods. If treatments are more expensive, fewer acres can be treated with the same amount of funds. Several actions associated with range management could benefit the wildland fire program by reducing FRCC. These actions include reduction of spreading invasive species, such as cheat grass, and actions that treat invasive species.

Altered Project Design and Improved Effectiveness As leasable development occurs, the needs for off-site mitigation to improve, restore, or create suitable GRSG habitat will increase as the level of disturbance approaches the anthropogenic limit. The increase in off-site mitigation could create opportunities to reduce fuel loading and increase resiliency on the landscape. It would do this through development of plans, and placement of proposed treatment where they would benefit GRSG and wildland fire management. This combined effort to reduce the fuel loading and improve habitat will increase the amount of vegetation treatments possible and will reduce the impact on the overall disturbance on the landscape.

Impacts from Locatable and Salable Minerals Management

Development of mineral resources increases the risk of wildfires by introducing new ignition sources (Shlisky et al. 2007). Geophysical exploration, especially when utilizing overland travel,

could temporarily increase the potential human-caused ignitions. Restrictions and closures would reduce opportunities for human-caused ignitions.

Limitations on mineral development would have an indirect effect of decreased fire due to less development, fewer vehicles, and less construction equipment, all of which would serve to decrease the chance of human-caused ignition. However, the rest of the planning area would continue to experience current levels of risk for human-caused ignitions and the resultant shift in FRCC. Similarly, limitations on development in areas previously leased would limit the risk of human-caused ignition in PPMAs.

Development of federal minerals underlying non-federal surface ownership may impact fire management on BLM-administered and Forest Service-administered lands, particularly when ownership is in a checkerboard pattern, as fires ignited on non-federal lands may quickly spread onto and impact federally administered lands.

Impacts from Renewable Energy Management

Associated facilities, infrastructure and transmission lines from renewable energy activities can increase fire and fuels program costs while decreasing fire management flexibility with regards to suppression options. Energy development also poses hazards to firefighters, from unknown toxins, facility protection, evacuation of industry personnel, and dangerous overhead power lines. Fire programs could incur additional costs to train firefighting personnel for emergency situations associated with energy development.

Increased Planning, Increased Project Cost, Increased Fuels Management Cost

Limiting wind energy development to locations outside of all designated PPMAs may increase surface loading. Areas outside of the PPMAs can range from pinion and juniper woodlands, to mixed brush vegetation to grassy slopes. These communities in general have higher fuel bed depth and fuel loading than the predominant GRSG/sage brush vegetation community. This would increase the values at risk from wildland fire in more susceptible areas.

The level of planning and the size of the project treatment are directly tied to the size and type of fuels and the values at risk. The larger the fuel type, the greater the distance to be cleared because of radiant heat, and flame lengths. The value at risk would identify the level of vulnerability or susceptibility to damage if a wildland fire were to occur. The higher the fuel load, more planning is required to cover any vegetative treatment around any established value at risk. There is either increased line construction or mechanical improvements around a value prior to any implementation action. If the values are too great or if not all of the risks may be mitigated, then the likelihood of multiple treatments mechanical, chemical, prescribed fire (pile or broadcast) would occur. Therefore, the cost per acre would increase due to the equipment operational costs. Any increase in the cost per treatment would decrease the size of the treatment.

The impacts on wildland fire and fuels management to solar energy projects are similar in wildland fire ecology and fire management activities. Except the footprint of the project area would be significantly larger directly under the solar arrays.

Impacts from Recreation Management

Human Caused Fires

The increase in SRPs may slightly increase human caused fire risk, based upon the assumption that increased human activity increases wildland fire risk. Recreation users are unlikely to cancel planned activities in response to trail or area closures caused by fire or fuels management. Rather they are expected to shift their activities to different, nearby lands and trails. Few human wildfire ignitions are a direct result of activities associated with SRPs, which usually are highly regulated during the permit process based upon the assumption that issuing permits reduces the risk activities that could cause a wildfire. Short-term loss of recreation from fire and fuels management activities generally causes short-term suspension of most recreation activities within the immediate area of the project or incident.

Dispersed recreation use such as ATV use, camping, hunting, and hiking increases the potential for human caused fire. Developed recreation areas would be prioritized for fire suppression to protect human life and property. Recreation use could slow emergency stabilization and rehabilitation efforts post fire and impact vegetation treatments through direct damage to seeded areas.

Impacts from Special Designations Management

Wildland fire suppression objectives would follow the appropriate management actions from Wilderness, WSAs, NHTs, NCAs, or WSR management plans.

4.8.4. Alternative A

Under Alternative A, fewer management actions would be applied specific to GRSG habitat protection, therefore impacts on fire management would vary across the planning area based on site-specific habitat objectives for other resource concerns. Within the sub-region, all LUPs address fire suppression and fuels management. Each LUP supports the development and adherence to a more detailed fire management plan that outlines priorities and levels of suppression for particular vegetation classes, or resource protection. Most plans support objectives of re-introducing fire into fire-dependent ecosystems and utilize the FRCC framework to aid in prioritizing response to wildfires and determining where fire can be used to meet land management plan objectives. Most plans place priority for suppression on the protection of life and property followed by important resource values. The more recent LUPs contain specific objectives and management action for suppression and management of fires within sagebrush vegetation communities and GRSG habitat in accordance with local conservation strategies.

Impacts from Greater Sage-Grouse Management

Surface disturbance produced would generally contribute to the modification of the composition and structure of vegetation communities (including an increase in invasive and noxious weed proliferation). This proliferation could then likely cause the potential for increased fire spread and activity. Therefore, management actions that minimize disturbance for GRSG would reduce the potential risk of fire.

Under Alternative A, special provisions that are related to GRSG protection are limited. There is no PPMA or PGMA designated or identified and few limitations on resource uses are directed towards GRSG protection. There is limited potential in the current management for site-specific restrictions on development as a result or measures to protect, maintain, and enhance habitat for GRSG and other special status species. In addition, many LUPs contain management actions to prohibit surface disturbing or other disruptive activities within GRSG breeding, nesting and some cases winter habitat within a certain distance and between certain dates.

Where there are restrictions to development in place (specifically for GRSG or other special status species management) the level of risk for fire ignitions and higher intensity fires would be decreased. The level of impacts would depend on the site-specific restrictions currently in place in the LUPs which is likely to be lower than all other alternatives.

Unplanned fire ignitions could cause short-or long –term damage to habitats depending on the seral type affected, extent, severity of fire and use of habitat by certain species. In the short term, fire removes nesting and cover habitat and leaves bare areas that provide little habitat value and could erode and cause sedimentation of waterways. Fire could displace species from suitable habitat, which could increase competition for resources in adjacent habitats. In the long term, wildland and prescribed fire, as well as fuels treatments, may improve habitats by increasing structural and age diversity. Often, natural and planned fires used for fuels treatments and to meet land management plan objectives lower the risk for an uncharacteristic wildfire that can destroy larger acreages or wildlife habitats.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Riparian, Wetland and Water resource management could restrict suppression operations by limiting use of heavy equipment or retardant near streams or riparian areas.

Impacts from Vegetation Management

This alternative retains current fire and fuels management objectives under current LUPs. Within the sub-region, all LUPs address fire suppression and fuels management. Each LUP supports the development and adherence to a more detailed fire management plan that outlines priorities and levels of suppression for particular vegetation classes, or resource protection. Most plans support objectives of re-introducing fire into fire-dependent ecosystems and utilize the FRCC framework to aid in prioritizing response to wildfires and determining where fire can be used to meet LUP objectives. Most plans place priority for suppression on the protection of life and property followed by important resource values. The more recent LUPs contain specific objectives and management action for suppression and management of fires within sagebrush vegetation communities and GRSG habitat in accordance with local conservation strategies and the Sage Steppe Final EIS (BLM 2008f) for vegetation treatments. This alternative allows for the greatest potential of surface disturbance as there are fewer vegetation management use restrictions. Surface disturbance would generally modify the composition and structure of vegetation communities (including increases in noxious weed proliferation) which would likely increase fire potential and spread. Increase in program costs would also be realized because of the increased potential for fire.

Impacts from Livestock Grazing Management

Range grazing management can impact the BLM's ability to manage fire as a natural process due to the influence of grazing on fine fuels availability (e.g., grasses). Livestock grazing reduces fuel loads, so a reduction in grazing intensity or change in grazing location, implemented as a result of the Rangeland Health Determination process, may lead to changes in fuel levels at site-specific locations. The impact would be to reduce fire risk potential especially in areas where grass fuel types are the main carrier of the fire. Under Alternative A in the planning area, 49,155,000 acres would be open to grazing (all existing PPH and PGH). Livestock grazing would result in site-specific reduction in fuels and the associated risk of wildland fire as described above.

Impacts from Fire and Fuels Management

Management actions under Alternative A would place minimal restrictions on fuels management and fire suppression control methods, and therefore would have few impacts on fire management.

Management actions that are intended to improve, create, or re-establish healthy ecological conditions in various vegetation types benefit the fire and fuels program in the long term by shifting FRCC to historic conditions and promoting the most efficient use of fire and fuels resources. Management under Alternative A would generally allow for the use of prescribed fire and vegetative treatments where needed. Fire suppression would be prioritized to protect human life, human safety and high value resources as well as manage wildfire for land management objectives. Impacts would vary throughout the planning areas based on site-specific habitat objectives and treatments applied.

Due to the flexibility in management of prescribed and wildland fires and lack of specific areas prioritized for protection, fire suppression and fuels treatment costs are likely to be the lower under Alternative A.

The lack of consistent seasonal restrictions for implementation of fuels treatments with Alternative A would result in more acres treated on an annual basis therefor reducing the amount of acres that are currently classified as condition class II and III.

Impacts from Wild Horse and Burro Management

Wild horse grazing can impact the ability to manage fires as a natural process changes in fine fuels availability (e.g., perennial grasses). Grazing reduces fine loads so a reduction or change in AML can in turn change the fine fuels in site-specific locations. The impact would be the greatest where fine fuels are the primary fire carrier.

Under Alternative A, there are currently 7,370,000 acres of Herd Areas, 6,086,200 acres of Herd Management Areas and 344,600 acres of Wild Horse and Burro Territory for a total of 35,205,100 acres. Grazing would result in site-specific reduction of the fine fuels and reduce the associated risk of wildland fire; however, this could result in a negative impact to achieve a historically natural FRCC.

Impacts from Climate Change Management

Management resulting from climate change is specific to individual land use plans. Many of the plans are silent with respect to climate change but do include management that addresses climate change issues, such as management of livestock during drought conditions. Management under Alternative A could increase FRCC, as existing climate changes issues would continue to contribute invasive annual grasses expansion and encroachment of pinyon-juniper woodlands. This could then result in an increase in fire size, extent and severity. This would also increase fire suppression costs, increase fuel treatment planning and costs.

Impacts from Leasable Minerals Management

The BLM would place some limitation on fluid mineral development, which would indirectly decrease the risk of fire due to fluid mineral development, vehicle traffic, and construction equipment. Impacts to fire would be dependent on the number of facilities constructed and disturbance footprints which would affect wildfire potential, increase fire suppression priorities and vegetation management strategies. Higher FRCCs would continue under this alternative

Impacts from Locatable and Salable Minerals Management

Within the sub-region, all lands are generally open to mineral location under the mining law. There are specific locatable mineral withdrawals for particular ROWs, designated wilderness areas, areas of critical environmental concern and other administrative needs. There are no locatable mineral withdrawals specific to protecting GRS habitat. All locatable mineral activities are managed under the regulations at 43 CFR 3800 and 36 CFR 228 through approval of a Notice of Intent or a Plan of Operations. Mitigation of effects on GRS and habitat are identified through the NEPA process approving plans of operation. Goals and objectives for locatable minerals are to provide opportunities to develop the resource while preventing undue or unnecessary degradation of public lands.

The BLM would place some limitations on mineral development, which would indirectly decrease the risk of fire due to fluid mineral development, vehicle traffic, and construction equipment. Impacts to fire would be dependent on the number of locatable facilities constructed and disturbance footprints which would affect wildfire potential, increase fire suppression priorities and vegetation management strategies. Higher FRCCs would continue under this alternative.

Impacts from Land Uses and Realty Management

Land and Realty primarily influences ROWs, land tenure adjustments, and proposed land withdrawals. Many LUPs in the sub-region do not contain specific goals, objectives or management actions directly related to GRS conservation. Recently adopted LUPs, such as those in California, identify timing restrictions and buffers for ROWs that may affect GRS habitat. Mitigation is typically developed during the NEPA process for site-specific actions. Some LUPs and the State GRS conservation strategy identify objectives to acquire sensitive GRS habitat or easements where appropriate or within PMUs. Lands and reality actions may result in an associated increase in fire risk. Development for energy and mineral resources can increase the risk of wildfires by introducing new ignition sources (Shlisky et al. 2007). For example, the issuance of a ROW grant can increase the risk of human caused ignition if the constructions of transmission lines, renewable energy projects or other development occur by increasing human activities in the area for both development and maintenance of facilities. Roads created during development and maintenance of facilities can facilitate the spread of exotic plant species (Gelbard and Belnap 2003). This in turn can create an increase in annual grasses causing increased fire intensities. Although, these developments could also create more roads and infrastructure that may be used as access to fires for suppression and used as control lines in suppression activities.

Under Alternative A, there are no common management practices across the sub-region therefore impacts from GRS will generally be impacted by site-specific NEPA planning. As discussed above, risks from human caused fires from development would be lowest in exclusion areas and highest in areas to new development.

Impacts from Renewable Energy Management

Under Alternative A, 276,600 acres are managed for exclusion and 114,200 acres are managed for avoidance of wind energy within existing PPH/PGH. Management under Alternative A includes 1,492,800 acres in the Solar PEIS variance areas within PPH/PGH. As discussed above in Section 4.8.3, Impacts Common to All Alternatives, in areas where solar or wind energy facilities are permitted, there would be continue to be impacts on wildland fire and fire management, because construction could result in a shift in FRCC, construction and use of the facilities could increase the likelihood of human-caused wildfire, and the presence of the facilities could interfere with wildland fire prevention or control.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative A, a potential for human-caused ignition and an increase in invasive annual grasses would be highest in the 12,745,000 acres open to cross-country use, with reduced risk in the 4,113,300 acres limited to existing routes and 874,400 acres closed to motorized vehicles.

Impacts from Recreation Management

This alternative would not prioritize fire management activities in GRSG habitat, and there would be no increased likelihood of wildland impacts from recreation activities. ES&R treatments and vegetation management treatments may be directly impacted due to damage of seeded areas from recreation use.

4.8.5. Alternative B

Management actions under Alternative B would focus on fire suppression in PPMAs and would impose some limits on fuels treatments in this area, resulting in higher level of protection but reduced management options in this area.

Impacts from Greater Sage-Grouse Management

Maintain or increase current populations by managing or restoring priority areas so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet GRSG needs. Manage PPMAs so that discrete anthropogenic disturbances cover less than three percent of the total GRSG habitat regardless of ownership. This would decrease the chance for human-caused ignition in PPMAs.

Fire can be either discrete or diffuse depending on its characteristics and the scales at which it is measured. GRSG are extremely sensitive to discrete disturbance (Johnson et al. 2011; Naugle et al. 2011) although diffuse disturbance over broad spatial and temporal scales can have similar, but less visible effects.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Impacts would be similar to Alternative A.

Impacts from Vegetation Management

Under Alternative B, prioritizing implementation of restoration projects based on environmental variables that improve chances for project success in areas most likely to benefit GRSG (Meinke et al. 2009) by prioritizing restoration in seasonal habitats that are thought to be limiting GRSG distribution and abundance would be a high priority. Fire and fuels management policies would be designed to protect sagebrush ecosystems by maintaining sagebrush cover, applying seasonal restrictions, protecting winter range, and requiring the use of native seeds. Post fuels treatments and ESR management would be designed to ensure long-term persistence of seeded areas and native plants. These proposed modifications to fire and fuels management would result in an increase in the protection of sagebrush vegetation compared with Alternative A. Prioritizing fire suppression in PPMAs and PGMAs would protect vegetation from the destructive effects of wildfire, but could result in increased fuel load and spread of noxious weeds.

Impacts from Livestock Grazing Management

Under Alternative B, the BLM would open the same acres (49,155,000 in the planning area) to grazing as Alternative A; however, Alternative B would limit grazing in PPMAs unless the treatment conserves, enhances, or restores GRS habitat. This may limit the total amount of treatment allowed on the landscape, potentially increasing FRCC, as well as, the probability and severity of fire. Monitoring invasive species and treating noxious weeds under this alternative could decrease FRCC, fire probability and severity.

Impacts from Fire and Fuels Management

In priority habitat and general habitat, prioritizing suppression immediately after firefighter and public safety to conserve habitat would limit suppression options. It would also increase costs for fire management programs as compared with Alternative A. This is because aggressive suppression response to conserve and protect would require more suppression resources. However, the decision to prioritize GRS habitat over property or infrastructure is one to be made by land managers and incident command staff.

Fuels management projects in PPMA would be designed to reduce wildfire threats and decrease the risk of high-intensity fire in PPMAs in the long term. Restrictions on the location of fuel breaks, and location of other fuels treatments, however, would reduce management options and would increase costs of fuel management.

Seasonal restrictions for implementation of fuels projects may limit the amount of fuels treatments that can be accomplished therefor potentially decreasing the amount of acres that can be treated annually.

Frequency and intensity of wildland fire would be more natural under Alternative B in the long term because post fuel and restoration management would be designed to ensure long-term persistence of seeded or pre-burn native plants. This shift would be of particularly important for PPMAs currently in Condition Classes II and III.

Impacts from Wild Horse and Burro Management

Wild horse and burros have the potential to impact habitats used by GRS by reducing grass, shrub and forb cover and increasing unpalatable forbs and exotic plant including cheatgrass (Beever and Aldridge 2011). Develop or amend HMA plans to incorporate GRS habitat objectives and management considerations for all HMAs/WHBTs.

Although Alternative B would have the same Herd Areas, Herd Management Areas Wild Horse Territory as Alternative A, if herd management area plans for HMAs/WHBTs were amended within PPMAs, the impact could result in an increase of fine fuels and could then result in an increase in fire size, extent, and severity in the short term. This would also increase fire suppression costs, increase fuel treatment planning and costs. However, a long-term outcome would improve the habitat and move toward a historic FRCC.

Impacts from Climate Change Management

Management under Alternative B could be impacted by an increase in FRCC, as more areas could be supported for invasive annual grasses and encroachment of pinyon-juniper woodlands. This could then result in an increase in fire size, extent and severity. This would also increase fire suppression costs, increase fuel treatment planning and costs.

Impacts from Leasable Minerals Management

Similar to Alternative A.

Impacts from Locatable and Salable Minerals Management

Similar to Alternative A.

Impacts from Land Uses and Realty Management

In Alternative B the ROW/SUA avoidance was increased from 114,200 acres to 4,932,400 acres a 96 percent increase and ROW/SUA exclusion from 276,600 acres to 12,693,500 a 79 percent increase acres from that of Alternative A within the planning area. This would decrease the potential for human caused wildfires from that of Alternative A. However, by reducing ROW grants and SUAs, it may reduce roads and in turn reduce potential fire suppression control lines.

Impacts from Renewable Energy Management

Impacts from renewable energy management would be the same as for Land Uses and Realty Management.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative B, potential for human-caused ignition and an increase in invasive annual grasses would be possible in the 3,866,100 acres open to cross-country use. This is a reduction of 8,879,000 acres open to cross-country traffic compared with Alternative A. There is no change in acreages of closed areas.

Impacts from Recreation Management

This alternative would limit the issuing of SRPs in PPMAs, unless the SRP has neutral or beneficial impacts on the habitat. This could limit SRPs that are being issued, and could reduce human activities in these areas and slightly reducing human-caused wildfires.

4.8.6. Alternative C

Management under Alternative C would have the broadest restrictions on fuel management activities extending to all occupied habitat by limiting fuel treatments to the interface of human habitation, and existing disturbances.

Impacts from Greater Sage-Grouse Management

Protect remaining occupied GRSG habitats from chronic grazing disturbance and new development. Management under Alternative C would have broader restrictions on resource use and highest level of protection for all occupied GRSG habitat than Alternative A. This would further reduce opportunities for human-caused fires. Under Alternative C 17,732,900 acres would be designated as PPMAs. However, the reduction of grazing would increase fine fuels that carry fire and could increase fire risk and large fire occurrence.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Similar to Alternative A.

Impacts from Vegetation Management

The BLM and Forest Service would place restrictions on fire and fuels management when it would be beneficial to PPMAs. The BLM would design and implement fuels treatments and suppression with an emphasis on protecting existing sagebrush. Sagebrush canopy cover would not be reduced unless fuels management objectives require additional reduction in sagebrush cover. Restrictions placed on fire and fuels management under this alternative would impact the ability to efficiently manage fuels and could increase the potential for wildfire costs of vegetation management and fire suppression. FRCCs would slowly be reduced overtime in areas where natural rehabilitation is achievable.

Impacts from Livestock Grazing Management

Under Alternative C, no livestock grazing would be permitted within PPMAs. In the short term, fine fuels would increase throughout occupied habitat and fire risk would increase as well as FRCC. In the longer term use restrictions limiting disturbance would stabilize FRCC.

Impacts from Fire and Fuels Management

Fuel management actions under Alternative C would be less restrictive than Alternative A.

Under Alternative C, fuels management activities would be limited to the interface of human habitation, and previously disturbed areas. Reducing vegetation treatments that mimic the natural fire effects would increase the FRCC resulting in an increased potential for large intense wildfires.

This increased potential for large wildland fire would increase costs associated with both fire suppression and post fire rehabilitation. An increase in fire size would increase the exposure to firefighters and public to the inherent risks associated with firefighting.

Increased fuels would result in areas of dense vegetation that would exhibit high fire intensities that would dictate an indirect fire suppression strategy. An indirect fire suppression strategy would increase the overall fire size, which would in turn compromise important GRSG habitat.

Impacts from Wild Horse and Burro Management

The impacts under Alternative C would be similar to that of Alternative A as HAs, HMAs, and WHBTs remain the same.

Impacts from Climate Change Management

Management under Alternative C would be impacted by an increase in FRCC, as more areas could be supported for invasive annual grasses and encroachment of pinyon-juniper woodlands. This could then result in an increase in fire size, extent and severity. This would also increase fire suppression costs, increase fuel treatment planning and costs.

Impacts from Leasable Minerals Management

Same as Alternative A.

Impacts from Locatable and Salable Minerals Management

Same as Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative C, the potential for human caused fires would be reduced. Under Alternative C, the acres for ROW/SUA avoidance would remain the same as Alternative A; however, the acres for ROW/SUA exclusion would increase from 276,600 acres 17,732,900.

Impacts from Renewable Energy Management

Impacts from renewable energy management would be the same as those described for Land Uses and Realty Management.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative C, potential for human-caused ignition and an increase in invasive annual grasses would be the same as Alternative A.

Impacts from Recreation Management

This alternative would not prioritize fire management activities in GRSG habitat, and there would be no increased likelihood of impacts from recreation.

4.8.7. Alternative D

Alternative D management actions and related impacts would be similar to those described under Alternative B, but with an added emphasis on region-specific habitat needs and variations in requirements for specific GRSG habitat types resulting in more site-specific variation in fire management impacts. Management under Alternative D would also place added emphasis to pre-suppression planning, prevention, and educational objectives for fire suppression personnel.

Impacts from Greater Sage-Grouse Management

Management under Alternative D would have broader restrictions on resource use and highest level of protection for all occupied GRSG habitat than Alternative A. This would further reduce opportunities for human-caused fires. In Alternative D 12,693,500 acres are designated as PPMA and 5,039,400 acres as PGMA. However, the increase in vegetation produced by conserving sagebrush communities and habitats and restoration of native (or desirable) plants to create landscape patterns which benefit GRSG, promoting large intact sagebrush communities may increase fire threat. Establishing and maintaining fuel breaks identified under Alternative D would reduce fire threat and large-scale fires.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

In PPMA and PGMA habitat, where riparian extent is limited by shrub encroachment, management would consider fuels treatments including prescribed burning or other means to increase edge and expand mesic areas to improve late summer brood-rearing habitat, thus decreasing FRCCs, fire size, and extent.

Impacts from Vegetation Management

Management under Alternative D would prioritize implementation of restoration projects with the most flexibility to the hazardous fuels management and fire suppression program with an added emphasis on region-specific habitat needs and variations in requirements for specific GRSG habitat types, resulting in more site-specific variation in fire management impacts. Impacts from vegetation management would be similar in nature to those described under Alternative B. Under

Alternative D, actions would include treating PPMAs and opportunity areas to maintain and expand healthy GRS habitat. Vegetation treatments could reduce fuel loading, which would affect fire intensity and allow fires to be more easily controlled. Vegetation treatments also create early seral stage vegetation communities which generally fuel low-intensity fires. Restoration priority would include seasonal habitats identified as the limiting factor for GRS distribution and abundance and would include cooperation with local government and planning agencies. As a result, restoration efforts are likely to address management concerns for other resources than GRS, including fire management. Actions would result in a shift towards historic FRCC and reduction in fire risk.

Impacts from Livestock Grazing Management

Impacts from livestock grazing management would be similar to those described under Alternative B. Focusing management activities on allotments found not to be achieving RHS and that have the best opportunities for conserving, enhancing or restoring habitat for GRS would result in an improvement in habitat and return to historic FRCC in the long term.

Impacts from Fire and Fuels Management

Impacts from fire management would be similar in nature to those described under Alternative B. Under Alternative D, however, additional fuels treatments and other habitat treatments would be permitted with an emphasis on maintaining, protecting, and expanding sagebrush ecosystems. Emphasis would be concentrated in PPMAs; therefore, the long-term reduction in risk of high intensity fire would occur in these areas with particular importance to condition class III.

Seasonal restrictions for implementation of fuels projects may limit the amount of fuels treatments that can be accomplished therefor potentially decreasing the amount of acres that can be treated annually. Some additional flexibility would be incorporated into management, allowing for the use of prescribed fire on a site-specific level within GRS habitat, as appropriate.

Creating and maintaining effective fuel breaks in strategic locations, prioritizing suppression of fires in PPMAs and other proactive fire management activities, would reduce the size and intensity of wildland fires in PPMAs but would result in an increase in both fuels management and fire suppression costs.

Management under Alternative D would prescribe added measure for fuels treatment effectiveness and post fire rehabilitation activities and monitoring. These added measures would increase both fuels management planning and post fire rehabilitation costs, but would increase the awareness and encourage partnerships with other agencies and resource programs.

Management under Alternative D would limit the placement of fire suppression infrastructure in areas of solid sagebrush which would result in some loss of flexibility in management of wildfire and an increase in fire suppression costs. The added emphasis of prepositioning resources and prioritizing fire suppression immediately after firefighter and public safety would increase the use of resource, increasing firefighter exposure as well as overall program costs. However, it would result in a reduction in the loss of habitat from wildland fire. Under Alternative D, added measures would be incorporated in overall fire management planning to include pre-suppression, educational and prevention messages on the importance of GRS habitat. These added measures would increase planning time and costs, but would result in an increase in awareness among the fire community that would lead to an increase in GRS habitat.

Impacts from Wild Horse and Burro Management

Under Alternative D, active HMAs, HAs, and WHBTs would be managed to achieve GRSG habitat objectives in PPMAs and PGMAs. Within PPMAs and PGMAs, the AML within HMAs, HAs, and Forest Service WHBTs would be established or maintained so that they consider the life cycle requirements for GRSG populations in terms of forage and nesting cover. Wild horse and burro population levels in PPMAs and PGMAs would be managed within the established AML to maintain or enhance GRSG habitat objectives. In HMAs, HAs, and WHTs not meeting standards due to degradation that can be at least partially contributed to wild horse or burro populations, consider adjustments to AML through the NEPA process.

Under Alternative D, maintaining current AMLs within HMAs, HAs and WHBTs would be similar to Alternative A. If GRSG habitat was not meeting standards due to degradation and adjustments to AML were made to conserve, enhance or restore habitat, the result would improve the habitat and move toward a historic FRCC In the long term.

Impacts from Climate Change Management

Management under Alternative D would lessen the impacts on fire management the most by proactively reducing the risk associated with landscape stressors such as invasive annual grasses and the encroachment of pinyon-juniper woodlands. By placing treatment priorities on habitat quality, this could reduce the risk associated with fire by decreasing FRCCs along with fire size, severity and extent.

Impacts from Leasable Minerals Management

In this alternative as development occurs, the need for off-site mitigation to improve, restore, or create suitable GRSG habitat would increase as the level of disturbance through activities increases. This alternative would increase treatments in PPMAs and PGMAs in GRSG habitat. The increase in off-site mitigation could create opportunities to reduce fuel loading and increase resiliency on the landscape. It would do this by helping to develop plans, and place the proposed treatments where they could benefit wildland fire management and GRSG habitat. This combined effort to reduce the fuel loading and improve habitat would increase the amount of hazardous fuels and vegetation treatments possible and would reduce the impacts on the overall disturbance on the landscape even though there is a potential increase in fire suppression activities due to increased roads, equipment use, and human activities.

Impacts from Locatable and Salable Minerals Management

The BLM and Forest Service would place more limitations on mineral development in this alternative, which would indirectly decrease the risk of fire due to locatable and salable mineral development, vehicle traffic, and construction equipment.

The additional closure to mineral material disposal infrastructure supporting minerals development would decrease accessibility to remote areas for fire suppression and would reduce fuel breaks in the event of wildland fire.

Impacts from Land Uses and Realty Management

Under Alternative D, lands in PPMAs and PGMAs would be retained as public lands to conserve GRSG habitat in federal ownership. Manage land uses in PPMAs and PGMAs to reduce habitat fragmentation and maintain or enhance connectivity between habitats. Manage and minimize

the effects of land use authorizations on PPMAs and PGMAs through ROW grant stipulations. PPMAs and PGMAs would be managed as ROW/SUA exclusion for utility scale commercial wind and solar energy facilities and ROW/SUA avoidance for all other types of ROWs and SUAs. In priority and general habitat, no new road ROWs would be authorized except those necessary for public safety or administrative or public need tied to valid existing rights. Within priority and general habitat, allow industrial coal-fired or natural gas-fired energy, wind and solar facilities associated with existing industrial infrastructure (e.g., a mine site) to provide on-site power generation. Do not designate new planning ROW corridors in priority and general GRSG habitat. While ROW/SUA exclusion is the same as that of Alternate A.

Under Alternate D, ROW/SUA exclusion incorporates the same acreage as that of Alternate A; however, 17,456,300 acres would be managed as ROW/SUA avoidance, a 99 percent increase from 114,200 acres identified under Alternative A. Under Alternative D, excluding and avoiding new ROW or special use authorizations and related development in PPMAs and PGMAs would reduce opportunities for human-caused ignitions as compared with Alternative A. However, fire suppression response times could possibly increase over time because of no new road construction. These roads would also be used as fuel breaks and control lines during fire suppression activities.

Impacts from Renewable Energy Management

Impacts from renewable energy management would be the same as Alternative C.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative D, potential for human-caused ignition and an increase in invasive annual grasses would be reduced. This is because there are no areas open to cross-country use. This is a reduction of 12,745,100 acres open to cross-country traffic compared with Alternative A. This alternative will have the least impact on fire management because of the reduction in open to cross-country use. There is no change in acreages of closed areas.

Impacts from Recreation Management

Under Alternative D, SRPs would only be allowed in PPMAs and PGMAs that have neutral or beneficial effects on the GRSG. Because issuance of permits may increase exposure of the area to human activity and consequently the likelihood of human-caused ignition, wildfire risk from recreation activities may be decreased under this alternative as compared with Alternative A.

4.8.8. Alternative E

Alternative E would not delineate PPMAs or PGMAs and would not apply to lands in the state of California. BLM-administered lands in California would follow Alternative A. Alternative E objectives would focus on eliminating the threats to GRSG in the planning areas, including wildfire. Management actions would allow for some level of fuels treatments providing greater flexibility for wildfire management. This alternative places added emphasis on a comprehensive wildfire management program that engages all interagency partners (federal, state, and local), to reduce the threats of catastrophic wildfire, rapidly suppress wildfires, and rehabilitate lands damaged by wildfire.

Impacts from Greater Sage-Grouse Management

Limit habitat disturbance, including habitat improvement projects, in occupied and suitable habitat to not more than five percent per year, per GRSG Management Area, and to 20 percent in potential habitat unless habitat treatments show credible positive results (Connelly et al. 2000a). This limit does not apply to removal of invasive or encroaching vegetation where such removal actually creates habitat.

Impacts from Alternative E would be less than that of Alternative A because not more than five percent of the occupied and suitable and 20 percent in potential habitat would undergo habitat disturbance. This in turn will cause a shift in Condition Class to a more historical regime.

Maintain a mosaic of shrub cover conditions ranging from twenty percent to forty percent in nesting habitat to provide both habitat resiliency and preferred nesting conditions for GRSG in areas with high raven populations. Where this amount of shrub cover is not available (less than 25 percent), then perennial grass cover should exceed 10 percent (Coates et al. 2011) and annual grass cover should not exceed 5 percent (Blomberg et al. 2012). The increased shrub and grass cover will help move toward a historical FRCC. However, as shrub and grass cover becomes more and more continuous and ground cover is higher, the risk for large uncharacteristic fires increases.

Initiate landscape level treatments in SGMAs to reverse the effects of pinyon-juniper encroachment and prioritize treatments of Phase I and Phase II to restore healthy, resilient sagebrush ecosystems and to increase forb and grass cover. Aggressively implement plans to remove Phase I and Phase II encroachment and treat Phase III encroachment to reduce the threat of severe conflagration and restore SGMAs where possible, especially in areas in close proximity to occupied and suitable habitat.

Prioritize areas for treatment of Phase III pinyon-juniper encroachment in strategic areas to break up continuous, hazardous fuel beds. Treat areas that have the greatest opportunity for recovery to SGMAs based on ecological site potential. Old growth trees should be protected on woodland sites.

As under Alternatives B, C, D, and F, season- and GRSG habitat-specific restrictions on development would result in site-specific variation changes to habitat and associated change in FRCC and fire risks.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Management under Alternative E would lessen impacts from fire by providing technical assistance, project success monitoring, and financial support to areas across the state that were previously burned and currently threatened by fires due to noxious weed infestations or increased fine fuels. Non-federal land projects tasks include: fuels reduction through noxious weed decadent material removal, noxious weed and invasive plant treatments, and other forested and riparian area fire fuel load thinning. Native planting and reseeding in cleared areas and degraded riparian habitat areas could decrease FRCC and fire risk.

Impacts from Vegetation Management

Similar to Alternative D.

Impacts from Livestock Grazing Management

Similar to Alternative A.

Impacts from Fire and Fuels Management

Impacts from GRSG management would be similar to those described under Alternative B. Under Alternative E, emphasis would be on sagebrush habitat protection and restoration within the State of Nevada SGMAs.

Disturbance limits under Alternative E would include a general limit on new permanent disturbance of five percent of SGMAs on state or federally managed lands within Nevada. As a result, likelihood of human-caused ignitions would be reduced in these areas. As under Alternative D, season- and GRSG habitat-specific restriction on development would result in site-specific variation in changes to habitat and associate changes to FRCC and fire risk. Additional emphasis under Alternative E integrates the repositioning of suppression resources and preventative actions similar to Alternative D. Repositioning and preventative actions would increase the likelihood of successful fire management actions with response to wildfire, but increase overall management costs. Fuels reduction treatments would be similar to Alternative B, with added emphasis on coordination of state and local agencies and individual landowners.

Impacts from Wild Horse and Burro Management

Management under Alternative E would maintain wild horses at AML in HMAs to avoid and minimize impacts on SGMAs and evaluate conflicts with HMA designations in SGMAs and modify LUPAs to avoid negative impacts on GRSG and if necessary, resolve conflicts between the Wild and Free Roaming Horse and Burro Act and the Endangered Species Act.

Under Alternative E, impacts would be similar to Alternative A.

Impacts from Climate Change Management

Under Alternative E, the planning area could be impacted by an increase in FRCC, as more areas could be supported for invasive annual grasses and encroachment of pinyon and juniper woodlands. This could then result in an increase in fire size, extent and severity. This would also increase fire suppression costs, increase fuel treatment planning and costs.

Impacts from Leasable Minerals Management

Under this alternative, existing fire management objectives would be employed; similar to Alternative D.

Impacts from Locatable and Salable Minerals Management

Under this alternative, existing fire management objectives would be employed; similar to Alternative D.

Impacts from Land Uses and Realty Management

By following a strategy that seeks to avoid conflict with GRSG habitat by locating facilities and activities in non-habitat wherever possible there will similar impacts between Alternative E and Alternative D.

Impacts from Renewable Energy Management

By following a strategy that seeks to avoid conflict with GRSG habitat by locating facilities and activities in non-habitat wherever possible, there would be similar impacts as Alternative D.

Impacts from Comprehensive Travel and Transportation Management

Same as Alternative D.

Impacts from Recreation Management

Same as Alternative D.

4.8.9. Alternative F

Alternative F is very similar to Alternative B and it would impose some limits on fuels treatments in this area, resulting in higher level of protection but reduced management options. Alternative F prioritizes fire suppression in only priority GRSG habitat while Alternative B includes both priority and general habitat.

Impacts from Greater Sage-Grouse Management

Under Alternative F, sagebrush cover will be maintained or increased to cover at least 70 percent of the land. This may cause an increase in fire severity and size due to the increase in fuel loading over time. Management under Alternative F would also designate sagebrush reserves (BLM ACECs and Forest Service zoological special conservation areas), which would cause an increase in planning and implementation costs associated with special designations.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Management under Alternative F could lessen the impacts on fire by providing riparian protection which could serve as natural fire breaks. This management could decrease FRCCs in those areas.

Impacts from Vegetation Management

This alternative is similar to Alternative C; however, the restrictions on fire and fuels management when it would be beneficial to PPMAs and PGMAs would be reduced further. Sagebrush canopy cover would not be reduced unless fuels management objectives require additional reduction in sagebrush cover. Restrictions placed on fire and fuels management under this alternative would impact the ability to efficiently manage fuels and could increase costs of vegetation management and limit fire suppression options.

Impacts from Livestock Grazing Management

Impacts from livestock grazing would be similar in nature to those described under Alternative D. Under Alternative F, GRSG seasonal habitat requirements would be considered when managing sagebrush rangelands, resulting in more site-specific variation in management and related variation in FRCC, fuels levels, and fire risk.

Impacts from Fire and Fuels Management

From a fire and fuels perspective, little difference exists between Alternative F and Alternative B. Under Alternative F, suppression response would only include priority habitat. The effects would be the same as Alternative A except a slight reduction in fire suppression costs can be expected when compared with Alternative A.

Impacts from Wild Horse and Burro Management

The impacts under Alternative F would be similar to that of Alternative A as HAs, HMAs, and WHBTs remain the same.

Impacts from Climate Change Management

Management under Alternative F would result in an increase in FRCC, as more areas could be supported for invasive annual grasses and encroachment of pinyon-juniper woodlands. This could then result in an increase in fire size, extent and severity. This would also increase fire suppression costs, increase fuel treatment planning and costs.

Impacts from Leasable Minerals Management

Same as Alternative A.

Impacts from Locatable and Salable Minerals Management

Same as Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative F, the potential for human caused fires would be reduced. Under Alternative F, the acres for ROW/SUP avoidance would remain the same as under Alternative A; however, the acres for exclusion increased 276,600 acres to 12,693,500. The acres available for disposal have been reduced from 331,200 under Alternative A to 0 in Alternate F.

Impacts from Renewable Energy Management

Impacts on wildland fire and fuels management from renewable energy management under Alternative F would be the same as Alternative C.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative F, potential for human-caused ignition and an increase in invasive annual grasses would be the same as Alternative B as they both have the same amount of open, limited and closed travel areas.

Impacts from Recreation Management

This alternative could have a larger impact on reducing human caused wildfire associated with recreation because it would prohibit camping within 4 miles of active GRSG leks. This could limit wildland fires ignited from unattended or abandoned campfires. However, more than likely, it would just displace camping to another area and not reduce the overall human caused fire potential.

4.9. Livestock Grazing

4.9.1. Methods and Assumptions

Indicators

Table 4-28, Comparison of Range Management Indicators by Alternative, provides a summary of the indicators that were used to analyze the effects on range management under each alternative.

Table 4.29. Comparison of Range Management Indicators by Alternative

Indicator	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Active AUMs in allotments containing GRSG habitat (acres)	2,210,476	2,210,476	0	2,210,476	2,210,476	828,928
Restrictions to the ability to construct or maintain range improvements and conduct treatments (infrastructure and vegetation)	No Change	Increase	Increase	Increase	Neutral	Increase
Allotment acres closed to livestock grazing in PPMAs and PGMAAs for the life of the plan	0	0	39,782,904	0	0	9,945,726
Allotment acres open to livestock grazing that contain PPMAs and PGMAAs ¹ (acres)	39,782,904	39,782,904	0	39,782,904	39,782,904	29,837,178
Changes to type of livestock, timing, duration or frequency of authorized use, including temporary closures	No Change	Increase	NA; no grazing use proposed	Increase	Increase	Increase

Source: BLM and Forest Service 2013

¹If the allotment contains any PPMAs or PGMAAs, then the total allotment acreage was included in the acreage totals.

The following process was used to arrive at the active use by alternative in PPMAs/PGMAAs:

- Alt A: All or Nothing Approach. Active use in allotments including PPMAs/PGMAAs reflects total use for the allotment without adjusting for amount of PPMAs/PGMAAs in the allotment.
- Alt C: All or Nothing Approach. Occupied habitat (PPMAAs/PGMAAs) is closed to grazing, so all active use is eliminated in the affected allotment.
- Alt F: Twenty-five percent of the area with PPMAs/PGMAAs is rested each year, so Alt. A is reduced by 25 percent. Assumption is made that the Reduced Alt. A level reflects 50 percent use. AUMs are reduced 25 percent to match utilization limit.

Appendix H, Livestock Grazing, provides allotment-specific information on BLM-administered lands.

Assumptions

The analysis includes the following assumptions:

- All new and renewed leases and permits would be subject to terms and conditions determined by the authorizing officer to manage and achieve resource condition objectives for public lands and to meet land health standards for BLM-administered lands and desired conditions on Forest Service-administered lands.

- Range improvements (e.g., fences, pipeline, water wells, troughs, and reservoirs) could create a localized loss of vegetation cover throughout the improvements' useful life. Vegetation would be reestablished through reclamation practices consistent with adjacent vegetation along water pipelines and naturally along fence lines within five years to the extent practicable, whereas a portion of the disturbed areas remain disturbed during their useful life and would be revegetated only if abandoned.
- The construction and maintenance of range improvements would continue in the decision area as needed. New range improvements would be subject to limitations, as defined in the plan. Range improvements are generally intended to improve livestock distribution and management, which would maintain or improve rangeland health and could benefit the forage base and wildlife and GRSG habitat.
- By definition in this plan, livestock grazing is not considered a surface-disturbing activity, but it could affect the surface in areas where livestock concentrate such as around range improvements.
- By definition the term "Priority habitat" means PPMAs only.
- Planning Area Acreage: 49,868,700
- Allotment Acreage containing PPMAs/PGMAs: 39,782,904
- GRSG Habitat Acreage in Planning Area
 - PPMAs: 12,693,500 acres
 - PGMAs: 5,039,400
 - Total: 17,732,900 acres (36 percent of planning area)

4.9.2. Nature and Type of Effects

Impacts on livestock grazing are generally the result of activities that affect forage levels, areas open to grazing, the class of livestock, the season of use and timing, the ability to construct range improvements, and human disturbance or harassment of livestock in grazing allotments. Key types of impacts are detailed below.

Protecting GRSG habitat may directly affect livestock grazing if management requires limitations to areas open to grazing or available AUMs, modification of grazing strategies, or changes to season of use, which could result in increased time and cost to permittees/lessees or impact the ability of permittees/lessees to fully utilize permitted AUMs. For example, management actions to enhance habitat for GRSG could affect livestock grazing by restricting grazing intensity, retiring grazing privileges in some areas, or changing livestock rotation patterns, in order to maintain residual herbaceous cover in sagebrush habitat (NTT 2011). Conduct grazing management for all ungulates in a manner consistent with local ecological conditions that maintains or restores healthy sagebrush shrub and native perennial grass and forb communities and conserves the essential habitat components for GRSG (e.g., shrub cover, nesting cover). Areas which do not currently meet this standard should be managed to restore these components. Adequate monitoring of grazing strategies and their results, with necessary changes in strategies, is essential to ensuring that desired ecological conditions and GRSG response are achieved (USFWS 2013a).

Grazing allotments containing sagebrush habitat would be managed to maximize cover and forage for GRSG, not to maximize livestock forage, which could necessitate change in livestock management.

Management of vegetation resources to benefit GRSG may, however, indirectly benefit livestock grazing by increasing vegetation productivity and improving forage in the long term, especially in cases where current conditions are not meeting or exceeding land health standards. For example, in allotments with a history of intensive grazing, transitions in the composition of sagebrush communities may have occurred that have reduced cover or forage for GRSG (Cagney et al. 2010) and grazing livestock. However, when grazing management is put into place to promote health and vigor of the herbaceous community for livestock, this would generally result in sufficient herbaceous cover to meet habitat requirements for breeding GRSG (Connelly et al. 2000a).

Similarly, vegetation management designed to curb incursion of non-native annual grasses such as cheatgrass, encroachment of shrubs or woody vegetation, could remove forage in the short-term. However, these treatments generally enhance rangeland conditions in the longer term (NTT 2011).

Unregimented livestock grazing can have adverse impacts on riparian ecosystems (Armour et al. 1991); therefore, managing riparian habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, adding range improvements (such as cross fences and water gaps), and adjusting season of use and livestock numbers. Managing riparian habitat to maintain proper functioning condition would benefit grazing livestock by indirectly providing cleaner and more reliable water sources and more dependable forage availability.

Protecting water quality and watershed health could require changes in livestock management, such as deferring or shortening grazing periods, adding range improvements, excluding grazing from riparian areas, establishing riparian pastures, and increasing livestock herding. In areas requiring exclusion of grazers or other restriction on livestock management, these limitations could result in increased costs to permittees/lessees if changes resulted in AUM reduction or increased livestock management costs.

Recreation can affect livestock grazing directly through human disturbance and indirectly through rangeland degradation. Direct disturbance can include undesired animal dispersing or trespassing due to gates left open by recreational users; animal displacement, harassment, or injury from collisions or shooting; or damage to range improvements, particularly from the use of recreational vehicles or from recreational shooting. Disturbance could occur during the hunting season due to increased presence of people, vehicles, and noise and livestock shooting. In addition, OHV use results in indirect impacts, such as increased dust on forage in high use areas, leading to lower forage palatability. Limitations on recreational use in GRSG habitat could indirectly benefit livestock by reducing direct disturbances. Other direct long-term recreation impacts include disturbance caused by increased levels of human activities. The degree of impacts would vary with the intensity of recreation (that is, large numbers of people for SRP use would likely have a higher level of disturbance, as compared to frequent use by a small number of visitors), the timing of recreation activities (livestock could be more susceptible to disturbance during the spring when young are present), and location of recreation in the allotment (a higher level of disturbance could occur near areas frequented by livestock, such as water sources or salt licks). As stated above, limitations on recreational use in GRSG habitat could indirectly benefit livestock by reducing direct disturbances.

Limits on construction or use of transportation routes may affect livestock grazing practices. Road construction may cause loss of forage, harassment, and displacement; thus, reduction of

these activities may benefit livestock by reducing disturbances. Closing roads or trails not leading to range improvements would also increase forage availability when the area is rehabilitated or when natural rehabilitation occurs. However, limitations on cross-country travel may impact permittees/lessees ability to effectively manage livestock if exemptions are not granted for access to allotments. This does not apply to California BLM. Travel management actions for GRS habitat protection generally involve increased limitations or restrictions on travel management.

Wildland fire alters sagebrush habitat due to the long time required for sagebrush to regenerate, which allows for spread of cheatgrass and other invasive species (NTT 2011). Wildland fire would remove vegetation and forage over the short term. Additional impacts on livestock operations could occur when management actions or RDFs require a rest period following rehabilitation before grazing is reestablished. Changes in wildland fire suppression and fuels management to protect GRS habitat would have varying effects on livestock grazing. Measures to protect sagebrush habitat might reduce the spread of wildland fire and the associated disruption to livestock. The management of habitat for GRS using natural disturbance regimes, such as fire and using vegetative treatments to accomplish biodiversity objectives to improve plant community resilience, could also benefit livestock grazing in the long term by maintaining a balance of seral stages. In general, selectively thinning woodland species benefits livestock grazing by creating a healthier grass, forb, and shrub community.

Restrictions on ROWs/SUAs, or land transfers may indirectly impact grazing by reducing construction impacts from development of these ROWs/SUAs (such as dust, displacement and introduction of noxious weeds). Lands and realty actions taken to protect GRS habitat would involve avoiding or excluding ROWs and SUAs (e.g., for power lines, pipelines, and other structures) or land transfers in GRS habitat. However, the areas outside of GRS habitat to which ROWs/SUAs are relocated may see an increase in construction-related effects.

Energy and mineral development could impact grazing as follows: During the exploration and testing phase of energy and mineral development, the footprint of disturbance is usually small and localized, therefore minimal acres available for grazing would be directly impacted. However, during the exploration phase impacts on livestock dispersal and trespass could occur, increasing time and cost to permittees/lessees. Outside of the exploration and testing phase, surface disturbing development directly affects areas of grazing in the short term during construction of well pads, roads, pipelines, and solar and wind energy facilities. Potential impacts include changes in available forage, reduced forage palatability because of dust on vegetation, limit on livestock movement, harassment, temporary displacement of livestock, and an increased potential for the introduction and proliferation of noxious weeds that lack the nutritional value needed for productive grazing practices. In the long term, a smaller amount of grazing acreage is permanently lost from mining operations following rehabilitation. Improving roads associated with energy and mineral development could facilitate livestock management operations by maintaining or improving access to remote locations within allotments. Properly implemented BMPs and reclamation mitigation measures would likely improve rangeland health and forage levels for livestock. Reduction in energy and mineral development in GRS habitat could reduce potential impacts on grazing, described above. Management for energy and mineral development on split-estate lands would not impact permittees/lessees with BLM public land leases; however, impacts could occur to livestock grazing on private, state, or lands of other ownership as stated above.

Changes in livestock grazing management could impact grazing opportunities in a variety of ways. For example, implementing particular livestock grazing management requirements to

benefit GRSG could affect livestock grazing by increasing operators' costs or changing required management actions. Short-term and long-term costs to permittees/lessees could increase, or AUMs could decrease for some permittees/lessees due to the following:

- Implementation of a grazing strategy
- Change in season-of-use or livestock class
- Modification to grazing systems
- Construction or modification of range improvements

These management requirements could result in economic impacts on individuals and the community at large, both direct and indirect. For example, if a ranch is dependent seasonally on federal forage, a reduction or eliminations of federal AUMs may create forage imbalances that produce a greater reduction in grazing capacity than just the loss of federal AUMs (Torell et al. 2005).

Some management changes may require a short-term output of cost for permittees/lessees, but will result in long-term benefits. For example, construction of range improvements to improve livestock distribution and allow use of a larger portion of the rangeland would generally enhance rangeland health in the long term; however, it could impact the livestock permittees/lessees economically in the short term. Constructing off-site water sources and fencing riparian and spring sources could keep livestock away from sensitive riparian areas and provide a cleaner more reliable source of water for livestock but would similarly represent an increased cost for permittees/lessees. In instances where a permit/lease was retired from grazing, the BLM would have to compensate the permittees/lessees for the range improvement projects constructed under a range improvement permit or cooperative agreement, in accordance with 43 CFR 4120.3-6(c).

Retirement of privileges would likely result in a reduction in conflicts between grazing and other land uses and may improve range health and forage conditions for remaining permitted use in the area.

ACECs may be designated to protect sensitive habitat for the benefit of GRSG. Grazing availability would depend on the designated ACEC management objectives. Restrictions could include reduction in grazing in the ACEC, limitations on the class of livestock animal, or the season, duration, or location that livestock are allowed to graze.

4.9.3. Impacts Common to All Alternatives

Impacts from Mineral Split-Estate

Across all alternatives, federal permittees would not be impacted by split-estate lands; however, there is the potential for impacts on range management on other lands. Under Alternative A, standard regulations are in place for mineral development on non-federal surface lands, including permitting and reclamation requirements.

Impacts from Travel

Under all action alternatives, motorized vehicles would be limited to designated roads in areas where travel management planning has been completed; these vehicles would be limited to existing routes in all other areas. This would limit the impacts on livestock grazing from

dispersed travel, as discussed under Nature and Type of Effects. Impacts from motorized and mechanized travel could occur as described in Nature and Type of Effects. Access to authorized uses, such as grazing allotments, would not be impacted under any alternative. Site-specific travel management planning could, when completed, reduce the potential for conflicts between range management and travel management.

4.9.4. Alternative A

Impacts from Greater Sage-Grouse

Under Alternative A, the BLM would conduct land health assessments on all allotments in existing GRSG habitat (39,782,900 acres). Land health assessments include analysis of the current condition of wildlife habitat against established rangeland health standards. If current conditions are lacking, the cause for non-attainment is determined and if livestock grazing caused, grazing use is altered to allow attainment of the standard in the future. This alternative affects all existing GRSG habitat over time. Changes to permitted AUMs could occur on up to all existing GRSG habitat acres. Management changes designed to address non-attainment of wildlife habitat standards would likely reduce permitted AUMs. Grazing management changes would include the timing, duration, or frequency of permitted use, including temporary closures. Construction and maintenance of range improvements would continue under this Alternative. Range improvement projects would be designed to maintain or improve GRSG habitats. Consideration of GRSG habitat needs would likely reduce the number of constructed range improvements. In some instances, improvements may be removed to assist in attainment of standards.

Impacts from Livestock Grazing

Under Alternative A, current levels and seasons of use will continue in the planning area pending completion of land health assessments. Livestock grazing would be allowed on 39,782,900 acres in existing GRSG habitat for a total of 2,210,500 AUMs in the planning area. Lands are managed to maintain healthy native plant communities and wildlife habitats. On BLM-administered lands, all permits/leases are required to meet or make progress towards meeting rangeland health standards defined in the applicable RAC developed Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997d). Permitted AUMs would most likely change in those areas found to be not meeting land health standards (especially the Wildlife Habitat/Special Status Species and Riparian Standards) as a result of livestock grazing at last assessment. This alternative affects all existing GRSG habitat over time. Changes to permitted AUMs could occur on up to all existing GRSG habitat. Management changes designed to address non-attainment of wildlife habitat standards would likely reduce permitted AUMs, change current timing, duration, or frequency of permitted use, including temporary closures. Drought management actions are directed to allotments with resource concerns.

Construction and maintenance of range improvements would continue under this alternative. Range improvements including fences; vegetation treatments, such as those in the Sage Steppe Ecosystem Restoration Strategy Final EIS (BLM 2008f); and water developments, would be allowed in the planning area when needed to support grazing systems or improve livestock distribution, allowing for options for management for permittees/lessees when needed to alter grazing use to meet rangeland health standards. Range improvement projects would be designed to maintain or improve GRSG habitats. Consideration of GRSG habitat needs would likely reduce the number of constructed range improvements. In some instances, improvements may be removed to assist in attainment of standards.

Impacts from Wild Horse and Burros

Overall management direction is to manage for healthy populations of wild horses and burros to achieve a thriving natural ecological balance with respect to wildlife, livestock use, and other multiple uses. Under Alternative A, wild horses and burros would continue to be managed within established HMAs or WHBTs and under established AMLs. Existing competition between wild horses and livestock would continue at current levels. In the Nevada portion of the planning area, wild horse and burros management is included in the Multiple Use Decision Process for forage allocation. This process could result in decreases to current permitted use in the planning area due to re-allocation of forage resources to livestock, wild horse and burros, and wildlife. Range improvement construction and maintenance could be increased if a need for additional water sources is identified for current populations of wild horse and burros.

Impacts from Vegetation Restoration and Weed Control

Under Alternative A, there would be few vegetation restoration treatments implemented specifically to maintain or improve GRS habitat. Current management implements the Integrated Vegetation Management Handbook policies (BLM 2008j), Land Health Standards, Vegetation Treatments Using Herbicides Programmatic EIS (BLM 2007a) and the Sage Steppe Ecosystem Restoration Strategy Final EIS (BLM 2008f), as well as other policies and plans. Vegetation treatments are focused on reducing hazardous fuels, ESR, controlling noxious weeds and invasive plants, and managing for sensitive species habitat to some degree. Management actions would be prioritized to meet land health and riparian standards and to control invasive plants and noxious weeds under the direction of current LUPs. Forage availability may increase in the long term due to improved land health and forage productivity. Management actions for invasive species would continue under the direction of Integrative Vegetation management directives. Weed control treatments would increase forage availability in the long term by improving native plant productivity.

Vegetation restoration may directly affect livestock grazing if treatments include restrictions on available grazing acreage or changes to permitted AUMs, grazing strategies, or season of use, which could result in increased cost to permittees. Required rest periods following treatments may impact the ability of livestock operators to fully utilize permitted AUMs.

Impacts from Climate Change

Impacts from climate change on grazing are manifested as drought conditions. Under Alternative A, there would be no additional restrictions to livestock grazing based on drought conditions within PPH other than those already specified in permit terms and conditions. Authorized grazing use in allotments may be changed due to drought conditions on an annual basis. Changes are related to the start and completion dates of grazing periods, which may result in a reduction of permitted AUMs for that year.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

As described under Nature and Type of Effects, managing riparian and wetland habitat can directly impact livestock grazing through excluding livestock at specific sites, increasing herding, adding range improvements (such as cross fences and water gaps), and adjusting season of use and livestock numbers. Such changes in grazing management options may result in an increase in costs and time required for permittees/lessees in these areas. Permitted use would decline based on specific actions taken to improve riparian areas to PFC especially on allotments in

existing GRSG habitat with hot season grazing. Range improvement construction/maintenance could increase or decline based on specific situations. Additional range improvements, such as upland water sources and riparian protection fences, would be constructed to facilitate riparian management. In areas where existing range improvements are contributing to riparian/water resource concerns, these improvements would be modified or removed.

Impacts from Recreation Management

Under this alternative, there would be no restrictions to SRPs related to GRSG in the decision area; therefore, livestock could be disturbed by recreational activities or groups in the planning area; however, due to the current low level of SRPs and limited interest in future SRPs in the planning area, impacts would likely be minimal. Impacts from general recreational activities would be as described under Nature and Type of Effects.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative A, as under all alternatives, motorized travel would be limited to existing or designated routes, and site-specific travel management planning would be developed, limiting disturbance to livestock. Effects would be the same as those described in Nature and Type of Effects.

Impacts from Fire and Fuels Management

Under Alternative A, wildfire suppression is not specifically prioritized in GRSG habitat. After firefighter safety, prioritization of suppression would be implemented for multiple resources protection. Wildfire alters sagebrush habitat due to the long time required for sagebrush to regenerate, which may allow for the invasion of invasive species (NTT 2011). Wildfire would remove livestock forage over the short term but can result in increases in forage post-fire. Impacts on livestock operations could also occur when a livestock grazing rest period is required following vegetation stabilization and rehabilitation treatments post-fire. These required rest periods may impact the ability of livestock operators to fully utilize permitted AUMs. The specific impacts on livestock operators would be short-term increased costs to provide alternative forage resources to livestock. The amount of impact on livestock permittees would depend on the location and intensity of the fire in relation to grazing allotments.

Under this alternative, no restrictions or priorities would be applied to fuels management in GRSG habitat. Areas treated to remove hazardous fuels would be prioritized to protect life, property, and sensitive resources. Treatment methods would include the use of manual, mechanical, chemical, and prescribed fire. Treatments typically are designed to remove western juniper and other shrubs and trees to prevent wildfire. Treatments implemented under this alternative may increase forage production for livestock in the long term due to increased herbaceous understory due to a decline in the cover of shrubs and trees. This would be dependent on the amount of tree cover removed from the plant community. On sites where additional sunlight would reach the herbaceous understory, there would also be an increase in forage quality and nutritional content.

Impacts from Renewable Energy Management

Under Alternative A, no new Renewable Energy ROW/SUA exclusion or avoidance areas are proposed for 17,732,900 acres of the decision area. Disturbance of livestock could result from development of ROWs. This alternative has the fewest acres subject to restrictions on renewable energy ROW locations. Management under Alternative A causes the highest level of disturbance

for livestock grazing. Reductions in permitted use and range improvement construction could occur.

Impacts from Salable Minerals

Under Alternative A, the fewest acres are subject to restrictions for mineral material disposal. Under Alternative A, the majority of the planning area and existing GRSG habitat is open to mineral material disposal on a case by case basis. Management under Alternative A causes the highest level of disturbance for livestock grazing. Disturbance of livestock grazing would result from development of sites. Reductions in AUMs and range improvement construction could occur.

Impacts from Locatable Minerals

Under Alternative A, the fewest acres are petitioned for withdrawal from mineral entry. Under Alternative A, the majority of the planning area and existing GRSG habitat is open to locatable mineral exploration or development. Management under Alternative A causes the highest level of disturbance for livestock grazing. Disturbance of livestock grazing would result from development of sites. Reductions in AUMs and range improvement construction could occur.

Impacts from Non-Energy Leasable Minerals

Under Alternative A, the majority of the planning area and existing GRSG habitat is open to non-energy mineral exploration or development. Management under Alternative A causes the highest level of disturbance for livestock grazing. Disturbance of livestock grazing would result from development of sites. Reductions in permitted use and range improvement construction would occur.

Impacts from Fluid Minerals (Oil, Gas, Geothermal)

Under Alternative A, 1,670,800 acres of BLM-administered lands in existing GRSG habitat would be open to fluid mineral development. Conflicts between grazing and mineral development would be more likely to occur in this area. While some decrease in disturbance to range management could occur as a result of surface use restrictions, there is the potential for disturbance in the majority of the decision area. Due to the limited reasonably foreseeable development of oil and gas and geo-thermal, impacts on range management from fluid mineral development would be minimal. Permitted use and opportunity to construct range improvements would be slightly reduced in areas open to development.

Impacts from Unleased Fluid Mineral

Within the sub-region, all BLM LUPs contain fluid mineral lease stipulations for oil and gas and geothermal resources, as well as non-energy leasable minerals that occur within GRSG habitat. These stipulations range from No Surface Occupancy within 0.25 mile of a lek to appropriate seasonal timing limitations based on GRSG biology. Timing limitations vary by type of habitat (e.g., lek, brood-rearing, winter) and are typically applied to a 2-mile (3.2-kilometer) buffer around leks. The more recent LUPs (e.g., Ely, Alturas, Eagle Lake, and Surprise LUPs) contain explicit exception, modification, and waiver language for each stipulation per BLM policy to address any special circumstances that would alter the lease stipulation requirements. Older LUPs typically do not provide exception, modification and waiver language. Forest Service plans contain similar direction; however, actual leasing on Forest Service-administered lands is delegated to the BLM.

While some decrease in disturbance to range management could occur as a result of surface use restrictions, there is the potential for disturbance in the majority of the decision area. Due to the limited reasonably foreseeable development of oil and gas and geo-thermal, impacts on range management from fluid mineral development would be minimal. Permitted use and opportunity to construct range improvements would be slightly reduced in areas open to development.

Impacts from Lands and Realty

Under Alternative A, no new ROW/SUA exclusion or avoidance areas would be present in the decision area. Disturbance of livestock could result from development of ROWs. This alternative has the most acreage identified for disposal. Land tenure adjustments would directly affect permitted use levels as those lands are no longer available for grazing use. This alternative would have the highest potential for impacts from lands and realty on livestock grazing.

Impacts from Areas of Critical Environmental Concern (ACECs) and Forest Service RNAs

No new ACECs are proposed. There would be no impact on current livestock grazing or range improvement construction/maintenance over that which is currently present. No changes to current permitted active use or requirements for range improvement construction/maintenance. Any restrictions on grazing activities and range improvement construction/maintenance in current ACECs would continue.

4.9.5. Alternative B

Impacts from Greater Sage-Grouse Management

On BLM-administered lands, land health assessments would be conducted on all allotments open to grazing; however, under this alternative, priority habitat would be highest priority. Changes to permitted AUMs could occur on up to all PPMAs habitat acres first. Effect is less than Alt A due to reduced area. Restrictions on construction and maintenance of range improvements would occur. Effect is less than Alt A due to reduced area.

Impacts from Livestock Grazing

Effects would be similar to Alternative A but focus on PPMAs. Livestock grazing would be allowed on 39,782,900 acres in GRSG habitat for a total of 2,210,500 AUMs in the planning area. Under Alternative B, the acres open to grazing and AUM allocations would be the same as under Alternative A. However, all GRSG habitat objectives and management would be incorporated into AMP and permit renewals; therefore, impacts would occur at a site-specific level during the permit renewal process or NEPA analyses on Forest Service-administered lands. On BLM-administered lands, completion of land health assessments and permits would be prioritized within PPMAs, particularly those with the best opportunity to conserve, enhance or restore habitat for GRSG. As a result, impacts on range management would be most likely to occur in these areas.

Under Alternative B, management actions (grazing decisions, AMP/Conservation Plan developments, or other agreements) to modify grazing management would be made to meet seasonal GRSG habitat requirements (Connelly et al. 2011a). As described under Nature and Type of Effects, this could require changes to management of a given allotment such as in class of livestock permitted, changes to livestock rotation or season of grazing permitted. Such changes would have the potential to decrease management options and, therefore, result in increased time and costs for permittees/lessees.

Work would be done with ranchers so that operations within GRSG habitat could be planned as single units; therefore, the time and cost required to implement these changes could be reduced, although they would still be higher than under current conditions where no change would be required.

In addition, retirement of grazing privileges would be an option in PPMAs. As described under Nature and Type of Effects, compensation for authorized range improvements on these lands would be given, conflicts with other land uses would be reduced and land health and forage could be improved.

Vegetation treatments that benefit livestock forage could only be completed if these treatments would also conserve, enhance or improve GRSG habitat; therefore, the management options in PPMAs could be reduced when treatments would not benefit GRSG, and the ability to fully utilize permitted AUMs could be impacted in such cases.

Specific objectives to conserve enhance or restore PPMAs based on ESDs would be developed and land health assessment to measure progress towards these objectives would be conducted. If it was found that allotments were not meeting standards, changes to grazing systems or AUM levels could be required and may result in increased costs or time for permittees.

Under Alternative B, structural range improvements such as fences and enclosures would be allowed in PPMAs, but must be developed to conserve or enhance GRSG habitat. In addition, fences would require flagging to lessen risk for GRSG impacts. The cost of building or maintaining these structures may be increased as compared with Alternative A. Similarly, new water developments from diversion from spring or seep sources would only be permitted when GRSG habitat would also benefit. The ability to construct these developments could be limited.

Impacts from Wild Horse and Burros Management

Effects would be greater than Alternative A. Under Alternative B, HMAs and WHBTs in PPMAs would be categorized a higher priority for gathers. For the livestock grazing allotments that overlap HMAs and WHBTs in PPMAs, wild horse and burro numbers would stay within AMLs, resulting in more forage availability for livestock. HMAs and WHBTs that do not contain PPMAs would be categorized as a low priority for future gathers. As a result, forage availability would decrease due to growing populations of wild horses that have not been gathered in those areas.

Impacts from Vegetation Restoration and Weed Control

Under Alternative B, meeting GRSG habitat objectives within PPMAs is the highest restoration priority. In addition, implementation of restoration projects would be based on seasonal habitats that are thought to be limiting GRSG distribution and abundance. Post restoration management to ensure long-term persistence could include changes in livestock grazing management, to achieve and maintain the desired conditions. Vegetation restoration may directly affect livestock grazing if treatments include restrictions on available grazing acreage or changes to permitted AUMs, grazing strategies, or season of use, which could result in increased cost to permittees. Required rest periods following treatments may impact the ability of livestock operators to fully utilize permitted AUMs. Impacts could occur should treatments for GRSG habitat not match with vegetation objectives for livestock grazing; however, in most cases, treatment would improve forage conditions in the long term.

Management actions that control invasive species would be prioritized in PPMAs. Unless treatments involve large acres, there would be limited short-term impacts on livestock grazing. Weed control treatments would increase forage availability in the long term by improving native plant productivity.

Impacts from Climate Change

Impacts from Alternative B are similar to the impacts described under Alternative A.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Effects would be greater than under Alternative A. Analyze springs, seeps and associated pipelines to determine if modifications are necessary to maintain the continuity of the predevelopment riparian area within priority GRSG habitats. Make modifications where necessary, considering impacts on other water uses when such considerations are neutral or beneficial to GRSG. Utilize fencing/herding techniques or seasonal use or livestock distribution changes to reduce pressure on riparian or wet meadow vegetation used by GRSG in the hot season (Aldridge and Brigham 2002; Crawford et al. 2004; Hagen et al. 2007). Authorize new water development for diversion from spring or seep source only when priority GRSG habitat would benefit from the development. This includes developing new water sources for livestock as part of an AMP/conservation plan to improve GRSG habitat. Effect is less than Alternative A due to reduced area (PPMAs). Permitted use would decline under Alternative B. Range improvements in PPMAs would be constructed, modified, or removed to facilitate riparian management. Effect is less than A due to reduced area (PPMAs).

Impacts from Recreation Management

Effects would be the same as Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative B, effects would be greater than Alternative A due to more acres in limited and fewer in open categories. Administrative access would allow range improvement maintenance to continue. In PPMAs and PGMAs, motorized travel would be limited to existing or designated routes under Alternative B. Travel plans to be completed would analyze PPMAs for the need for road closures, and limitations would be implemented during development of new roads. Some reductions in routes and limitations on new routes as well as upgrades to existing routes would be added compared to Alternative A, which could result in indirect reduction in disturbance to livestock in PPMAs. Closed or seasonally closed routes would still allow administrative access to existing range improvements.

Impacts from Fire and Fuels Management

Under Alternative B, wildfire suppression in PPMAs would be prioritized, with the focus on protection of GRSG habitat. Fuel breaks, fuels reductions, and other fire prevention techniques would be implemented to reduce the risk of wildfires in PPMAs. As a result, there could be fewer disturbances to livestock grazing within PPMAs, as there would be fewer wildfires in the long term. Measures to protect sagebrush habitat might reduce the spread of wildfire and the associated disruption to livestock operations. Forage availability would be maintained or increased long term. Emergency Stabilization and Rehabilitation treatments following a wildfire would be focused on restoring habitat consistent with GRSG habitat needs. These treatments would use locally selected native seeds where available, and may include temporary restrictions on

livestock grazing, motorized travel, and other uses. Livestock management may be adjusted to support successful restoration post-rehabilitation, which could result in a temporary or permanent reduction in permitted AUMs and forage availability in areas seeded post-fire. The level of impacts would depend on size, location, and intensity of fire and related level of restoration needed. Fine fuels management projects using livestock grazing have the potential to result in site-specific, temporary increases in available forage in PPMAs, but impacts would be small and localized. Effects would be greater than Alternative A.

Fuels management would be prioritized to maintain and improve GRS habitat. These measures focus on ensuring that activities related to fuels reduction to reduce the risk of future catastrophic fires do not significantly affect GRS populations through either disruption of GRS activities or destruction of occupied or suitable habitat. Mechanical, manual, and chemical treatments would be utilized to prevent conifer encroachment and prevent the spread of undesirable annual grass and weed species. These actions could improve forage in the long term.

Emphasis would be placed on ensuring that sagebrush cover is not reduced due to fuels treatment activities. Under this alternative, forage availability may decrease over time in areas of high sagebrush cover, due to a restricted ability to remove sagebrush through fire, mechanical, or chemical means to reduce fuel and increase herbaceous plants in PPMAs. A minimum rest period from livestock grazing of two growing seasons may be required following fuels treatments, depending on the nature of the treatment. The specific timing, type of rest, as well as any modification needed to livestock grazing use would be determined at the site-specific environmental assessment phase.

Impacts from Renewable Energy Management

Effects on livestock grazing are less than those under Alternative A. There would be fewer restrictions on grazing management and on range improvement construction. Under Alternative B, PPMAs would be managed as exclusion areas for new ROWs and SUAs with some exceptions; PGMAs would be managed as ROW/SUA avoidance areas. Under this alternative, approximately 17,732,900 acres PPMAs/PGMAs would be exclusion/avoidance areas.

Impacts from Salable Minerals

The impact from mineral material disposal on livestock grazing is less than Alternative A. More acres are closed to mineral material disposal. Fewer reductions in permitted use and restrictions on range improvement construction would occur.

Impacts from Locatable Minerals

The impact from locatable material disposal on livestock grazing is less than Alternative A. The largest numbers of acres are petitioned for withdrawal from mineral entry. Habitat mitigation and vegetation reclamation requirements would reduce the potential impacts on permitted use. The fewest reductions in permitted use and restrictions on range improvement construction would occur.

Impacts from Non-Energy Leasable Minerals

Under Alternative B, the impact on livestock grazing from non-energy mineral leasing would be less than under Alternative A. Approximately 12,693,500 acres of PPMAs would be closed to leasing so less acreage would be subject to development than under A. Fewer reductions in permitted use and fewer restrictions on range improvement construction would occur.

Impacts from Fluid Minerals

Same as Alternative A.

Impacts from Unleased Fluid Mineral

The effects from unleased fluid minerals management would be similar to Alternative A, but more limited due to less acreage affected due to PPMAs only. Permitted use and opportunity to construct range improvements in PPMAs would be unaffected due to closure. Leasing in PGMAs would be subject to stipulations so minimal impacts are expected.

Impacts from Lands and Realty

The effects from lands and realty management would be less than under Alternative A. The NTT Report recommends making PPMAs exclusion areas for new ROWs and SUAs with some exceptions (such as where proposed infrastructure could be collocated within an existing disturbance area) and PGMAs ROW/SUA avoidance areas. Under this alternative approximately 17,732,900 acres of PPMAs and PGMAs would be managed as ROW/SUA exclusion or avoidance areas. ROW/SUA avoidance/exclusion acreage is increased which would result in less disturbance to vegetation and permitted use than A. Less acreage is identified for disposal than under A. Reductions in permitted use, restrictions on maintenance of range improvements, and changes in timing, duration, or frequency of use would be less than A.

Impacts from Areas of Critical Environmental Concern (ACECs) and Forest Service RNAs

Same as Alternative A.

4.9.6. Alternative C

Impacts from Greater Sage-Grouse Management

Same as Alternative A.

Impacts from Livestock Grazing

Effects on livestock grazing would be greater than under Alternative A. No livestock grazing would be allowed on 39,782,900 acres in GRSG habitat for a total of 0 AUMS in GRSG habitat areas. Permitted use is eliminated on all allotments containing PPMAs acres. Construction and maintenance of range improvements in PPMAs would be eliminated under this alternative. Active restoration practices would be implemented to PPMAs/. These include: 1) Removal of livestock water troughs, pipelines, and wells. 2) Where possible, without further damage to springs/water sources, remove waterline piping and maximize water at spring/stream sources supporting diverse riparian and meadow vegetation.

Impacts from Wild Horse and Burros Management

Same as Alternative A.

Impacts from Vegetation Restoration and Weed Control

There would be no impacts on livestock grazing from vegetation restoration and weed control, as all grazing operations within PPMAs would be closed.

Impacts from Climate Change

There would be no impacts on livestock grazing, as all grazing operations within PPMAs would be closed.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Management under Alternative C would have a greater impact than under Alternative A. Permitted use would decline due to forage reduction based on livestock grazing elimination in PPMAs. Additional range improvements such as upland water sources, riparian protection fences, etc. would be constructed to facilitate livestock grazing management outside PPMAs. However, livestock grazing is eliminated in PPMAs under this alternative. There would be no effect on those acres.

Impacts from Recreation Management

Same as Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Management under Alternative C would have the same impact as Alternative A. Under Alternative C, due to no grazing in PPMAs, impacts from travel management on livestock grazing would be limited.

Impacts from Fire and Fuels Management

There would be no impacts on livestock grazing, as all grazing operations within PPMAs would be closed.

Impacts from Renewable Energy Management

Management under Alternative C would have the same impact as Alternative A. However, PPMAs are closed to livestock grazing under Alternative C. There would be no effect on livestock grazing on those acres.

Impacts from Salable Minerals

Same as Alternative A; however, PPMAs/PGMAs would be closed to grazing under Alternative C, so there would be no impact on grazing on those acres.

Impacts from Locatable Minerals

Same as Alternative A; however, PPMAs (17,732,900 acres) would be closed to grazing under Alternative C. There would be no effect on livestock grazing on those acres.

Impacts from Non-Energy Leasable Minerals

No effect on livestock grazing because livestock grazing would be eliminated in PPMAs under Alternative C.

Impacts from Fluid Minerals (Oil, Gas, Geothermal)

Same as Alternative A; however, livestock grazing would be eliminated on PPMAs (17,732,900 acres) under Alternative C. There would be no effect on livestock grazing on those acres.

Impacts from Unleased Fluid Mineral

There would be no effect on livestock grazing under Alternative C. Permitted use would be eliminated in PPMAs under this alternative.

Impacts from Lands and Realty

Effect is less than Alternative A. This alternative would have the most acreage managed as ROW/SUA exclusion and the least acreage identified for disposal. Also, use restrictions would be placed on all PPMAs acreage. Reductions in permitted use, restrictions on maintenance of range improvements, and changes in timing, duration, or frequency of use would be less than A. Also, livestock grazing is eliminated on PPMAs (17,732,900 acres) under Alternative C. There would be no effect on livestock grazing on those acres.

Impacts from Areas of Critical Environmental Concern (ACECs) and Forest Service RNAs

Acreages managed as ACECs would be the greatest of all alternatives. Grazing use would be phased out of ACECs over a three-year period. Range improvements would be removed from ACECs.

4.9.7. Alternative D

Impacts from Greater Sage-Grouse Management

Alternative D differs from Alternative A in the requirement to meet GRSG-specific objectives and guidelines contained in **Tables 2-6** and **2-7**. This alternative affects all PPMAs and PGMAs acres over time. Changes to permitted AUMs could occur on up to all PPMAs and PGMAs habitat acres. Changes would include the timing, duration, or frequency of permitted use, including temporary closures. Management changes designed to address non-attainment of GRSG habitat objectives would likely reduce permitted AUMs. Construction and maintenance of range improvements would continue under this Alternative. Range improvement projects would be designed to maintain or improve GRSG habitats. Consideration of GRSG habitat needs would likely reduce the number of constructed range improvements. In some instances, improvements may be removed to assist in attainment of standards.

Impacts from Livestock Grazing

The effect is greater than under Alternative A. Livestock grazing would be allowed on 39,782,900 acres in the planning area, for a total of 2,210,500 AUMs in the planning area. This alternative affects all PPMAs and PGMAs acres over time. Changes to permitted AUMs could occur on up to all PPMAs and PGMAs habitat acres. All PPMA and PPGA acres are required to meet rangeland health standards, especially wildlife/special status species habitat and riparian standards. Additionally, management changes designed to address nonattainment of GRSG habitat-specific objectives detailed in Table 2-6 would likely reduce permitted AUMs on BLM-administered lands. Changes would include the timing, duration, or frequency of permitted use. Temporary closures of livestock grazing would certainly occur.

Construction and maintenance of range improvements would continue under this alternative but at a much reduced level. Existing range improvements would be evaluated to make sure they conserve, enhance, or restore GRSG habitat. New range improvement projects would be designed to conserve, enhance, or restore GRSG habitats. Consideration of GRSG habitat needs

would likely limit the number and types of constructed range improvements. In some instances, improvements may be removed to assist in attainment of standards.

Impacts from Wild Horse and Burros Management

Effects would be greater than under Alternative A. Prioritize gathers in HMAs, HAs, and WHBTs to meet established AMLs in priority GRS habitat, unless removals are necessary in other areas to address higher priority prevent environmental issues, including herd health impacts. For all HMAs, HAs, and WHBTs within or that contain priority and general habitat, manage wild horse and burro populations within established AML to meet GRS habitat objectives. In HMAs, HAs, and WHBTs not meeting standards due to degradation that can be at least partially contributed to wild horse or burro populations, consider adjustments to AML through the NEPA process. Adjustments would be based on monitoring data and would seek to protect and enhance priority and general habitat and establish a thriving ecological balance. Permitted AUMs could change due to the Multiple Use Decision Process in effect in Nevada. No changes to construction and maintenance of range improvements would occur under this alternative.

Impacts from Vegetation Restoration and Weed Control

Impacts from management under Alternative D would be generally similar to the impacts described under Alternative B, except that Alternative D would implement treatments more specifically designed to improve seasonal habitats for GRS habitat. Wet meadows would be managed to maintain a component of perennial forbs with diverse species to facilitate brood rearing. Wet meadow complexes would be maintained to increase the amount of edge, and cover within that edge, to minimize elevated mortality during the late brood-rearing period. These treatments may result in more restrictions to livestock grazing and the ability to continue existing terms and conditions of permits. Additional acres may be closed to grazing temporarily within allotments to allow for riparian areas and meadows to rest from grazing in order to improve vegetation composition for GRS habitat.

Impacts from Climate Change

Under Alternative D, changes in livestock management may be required to protect GRS habitat due to drought conditions. Changes to current terms and conditions of permits would be changed to prevent over use of plant resources during periods of extremely dry weather and poor growing conditions, in order to maintain GRS habitat. Changes could include delayed turnout dates, reduced grazing periods, temporary closures of riparian areas and meadows, a reduction in AUMs or livestock numbers for a specified period, or other adjustments to livestock operations. These changes would reduce forage availability and increase the cost of livestock operations. The specific impacts on livestock operators would be short-term increased costs to provide alternative forage resources to livestock, or increased labor costs to herd or move livestock more frequently. The long-term impacts of protecting vegetation during drought conditions would be an increase in plant community stability and an increase in forage availability.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Effects on livestock grazing would be greater than under Alternative A. Alternative D would cause changes to current permitted use, based on specific actions taken to return riparian areas to PFC and improve plant community species richness. Changes to permitted use are most likely to occur in allotments with current hot season grazing use on riparian areas. Additional range improvements would be constructed to facilitate riparian management.

Impacts from Fire and Fuels Management

Impacts from Alternative D would be similar to the impacts described under Alternative B.

Impacts from Recreation Management

Under Alternative D, closing PGMAs/PPMAs to recreation facilities construction would reduce disturbance and conflicts as compared to Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Impacts would be less than Alternative A. This alternative would have the most acres limited and the least acres open. Under Alternative D, impacts would be similar to those described under Alternative B but with additional restrictions on upgrades, realignment of roads, and requirements for site-specific travel management planning completion applied to PPMAs and PGMAs. As a result, disturbance from travel management on livestock grazing would be limited.

Impacts from Renewable Energy Management

Impacts would be less than Alternative A. Management under Alternative D would designate PPMA and PGMA habitat as ROW/SUA exclusion for utility-scale commercial wind energy facilities and solar energy facilities. Fewer potential reductions in permitted use due to forage destruction/quality reduction would occur. Fewer acres would be subject to restrictions on range improvement construction.

Impacts from Locatable Minerals and Salable Minerals

The impact from locatable minerals would be the same as Alternative A. Impacts from mineral material disposal on livestock grazing would be less than Alternative A. The highest numbers of acres are closed to mineral material disposal. Habitat mitigation and vegetation reclamation requirements would reduce the potential impacts on permitted use. The fewest reductions in permitted use and restrictions on range improvement construction would occur.

Impacts from Non-Energy Leasable Minerals

Under Alternative D, the impact on livestock grazing from non-energy mineral leasing would be less than Alternative A. 17,732,900 acres of PPMAs/PGMAs would be closed to leasing so less acreage would be subject to development than under A. The fewest reductions in permitted use and fewest restrictions on range improvement construction would occur.

Impacts from Fluid Minerals (Oil, Gas, Geothermal)

Same as Alternative A.

Impacts from Unleased Fluid Mineral

Same as Alternative A.

Impacts from Lands and Realty

Impacts would be less than Alternative A. There are more acres identified as ROW/SUA avoidance areas than A and less acreage identified for disposal than A. Reductions in permitted use, restrictions on maintenance of range improvements, and changes in timing, duration, or frequency of use would be less than Alternative A.

Impacts from Areas of Critical Environmental Concern (ACECs) and Forest Service RNAs

Same as Alternative A.

4.9.8. Alternative E

Impacts from Greater Sage-Grouse Management

Similar to Alternative A.

Existing grazing permits would be evaluated to ensure that they maintain or enhance SGMAs. Based on a comprehensive understanding of seasonal GRSG habitat requirements, and in conjunction with flexibility of livestock operators, encourage land management agencies to cooperatively make timely, seasonal range management decisions to respond to vegetation management objectives, including fuels reduction. Livestock grazing would be used as a tool, when appropriate, to improve GRSG habitat quantity, quality or to reduce wildfire threats. Riparian areas would be managed for PFC.

Alternative A requires BLM grazing permits to be evaluated against Rangeland Health Standards in effect for the appropriate RAC administrative area. When currently permitted grazing use is determined to be causing the wildlife habitat, special status species habitat, or riparian areas to not meet or not make significant progress towards meeting land health standards, permitted grazing use would be altered by implementing appropriate grazing management guidelines by agreement or by grazing decision by the next grazing season. Targeted grazing used as a tool to achieve specific resource management objectives is allowed under Alternative A.

Under Alternative E, grazing permits would be evaluated on all allotments in SGMAs. This evaluation would analyze the current condition of GRSG habitat. If current conditions are lacking, and if livestock grazing caused, grazing use is would be altered to allow habitat conditions to improve in the future. This would be implemented through agreement under this Alternative.

This alternative affects all SGMA acres over time. Changes to permitted use could occur on up to all SGMA habitat acres. Management changes designed to address non-attainment of wildlife habitat standards could reduce permitted AUMs as under Alternative A. Grazing management changes would include the timing, duration, or frequency of permitted use.

Construction and maintenance of range improvements would continue under Alternative E, especially those designed for riparian management. Specific management actions include riparian fencing to provide control of the season, duration or degree of herbivory, providing alternate water sources away from the riparian area, changing the grazing system, or other grazing management practices that promote herbage removal within acceptable limits. As in Alternative A, range improvement projects would be designed to maintain or improve GRSG habitats.

Alternative E would result in positive impacts on GRSG habitat in SGMAs where cooperation is present. The major difference between the two alternatives is the BLM's requirement to implement grazing management changes by the next grazing season by agreement or by grazing decision, if necessary, when currently permitted use is determined to be causing a GRSG habitat related Standard to be unmet or not making significant progress. Alternative E stresses cooperative, seasonal adjustments to grazing use. Alternative E does not contain the BLM regulatory mechanism.

Impacts from Livestock Grazing

Impacts of Alternative E are similar to those from Alternative A.

Under Alternative E, the principle livestock grazing action is to “implement appropriate prescribed grazing conservation actions at scales sufficient to influence a positive population response in occupied and suitable GRSG habitat acres such as NRCS Conservation Practice Standard 528 for prescribed grazing (NRCS 2011).

Standard 528 is defined in the *Strategic Plan for Conservation of Greater Sage-Grouse in Nevada*, (State of Nevada 2012) as “Managing the harvest of vegetation with grazing and/or browsing animals.” The Plan goes on to further state: “This practice may be applied to improve or maintain desired species composition and vigor of plant communities, improve or maintain quantity and quality of forage for grazing and browsing animals’ health and productivity, improve or maintain surface and/or subsurface water quality and quantity, improve or maintain riparian and watershed function, reduce accelerated soil erosion, and maintain or improve soil condition, improve or maintain the quantity and quality of food and/or cover available for wildlife, and manage fine fuel loads to achieve desired conditions. In sage-grouse habitat, this practice is critical to ensure rangelands are managed sustainably to provide habitat requirements for all life stages of sage-grouse.”

Currently, The BLM is required to ensure that grazing use is permitted in conformance with established Rangeland Health Standards. Under current management, BLM grazing permits are evaluated against Rangeland Health Standards in effect for the appropriate RAC administrative area. When currently permitted grazing use is determined to be causing a Standard to not meet or not make significant progress towards meeting, permitted grazing use would be altered by implementing appropriate grazing management guidelines. BLM rangeland health standards are substantially similar to the desired conditions outlined in Practice 528 in Alternative E. Current BLM grazing management is required to meet many of the desired conditions outlined in Alternative E.

Under Alternative E, current levels and seasons of use will continue in the planning area pending completion of grazing permit evaluations. Livestock grazing would be allowed on 39,782,900 acres in SGMAs for a total of 2,210,500 AUMs in the planning area. Lands are managed to maintain healthy native plant communities and wildlife habitats.

All permits/leases would be required to meet or make progress towards conditions found in Standard Practice 528 as well as meeting rangeland health standards defined in the applicable RAC developed Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 1997d).

Permitted AUMs would most likely change in those areas found to be not meeting applicable standards (especially the wildlife habitat, special status species, and riparian standards) as a result of livestock grazing at last assessment. This alternative affects all SGMA acres over time. Changes to permitted AUMs could occur on up to all SGMA habitat acres. Management changes designed to address non-attainment of GRSG habitat standards would likely reduce permitted AUMs, change current timing, duration, or frequency of permitted use, including temporary closures. Drought management actions are directed to allotments with resource concerns.

Construction and maintenance of range improvements would continue under Alternative E. Range improvements including fences and vegetation treatments as well as water developments,

would be allowed in the planning area when needed to support grazing systems or improve livestock distribution, allowing for options for management for permittees/lessees when needed to alter grazing use to meet rangeland health standards. Range improvement projects would be designed to maintain or improve GRSG habitats.

Alternative E is substantially similar to Alternative A, Current Management. Permitted use would be expected to decline over current levels as grazing management is implemented to benefit GRSG. The major difference between the two alternatives is the BLM's requirement to implement grazing management changes by the next grazing season when currently permitted use is determined to be causing a GRSG habitat related standard to be unmet or not making significant progress. Alternative E does not contain this regulatory mechanism.

Impacts from Wild Horse and Burros Management

Same as Alternative A.

Impacts from Vegetation Restoration and Weed Control

Similar to Alternative B.

Impacts from Climate Change

Similar to Alternative A.

Impacts from Riparian Areas, Wetlands and Water Resources Management

Alternative E requires that BLM- and Forest Service-administered lands meet the standards for riparian vegetation such as outlined in the various RAC Standards and Guidelines for Ecological Health to meet the GRSG habitat requirements. Additionally, grazing management strategies for riparian areas should, at a minimum, maintain or achieve riparian PFC. Specific management actions include riparian fencing to provide control of the season, duration or degree of herbivory, providing alternate water sources away from the riparian area, changing the grazing system, or other grazing management practices that promote herbage removal within acceptable limits.

These actions mirror current management of riparian areas on public lands except Forest Service-administered lands are not covered by RAC standards.

Impacts from Recreation Management

Same as Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Same as Alternative D.

Impacts from Fire and Fuels Management

Similar to Alternative B.

Impacts from Renewable Energy Management

Same as Alternative A.

Impacts from Salable Minerals

Same as Alternative D.

Impacts from Locatable Minerals

Same as Alternative A, but focus on reclamation of sites based on ecological potential would benefit livestock grazing.

Impacts from Non-Energy Leasable Minerals

Same as Alternative A.

Impacts from Fluid Minerals (Oil, Gas, Geothermal)

Same as Alternative D.

Impact of Unleased Fluid Mineral

Same as Alternative A.

Impacts from Lands and Realty

Same as Alternative D.

Impacts from Areas of Critical Environmental Concern (ACECs) and Forest Service RNAs

Same as Alternative A.

4.9.9. Alternative F

Impacts from GRSG Management

Same as Alternative A.

Impacts from Livestock Grazing

Effects from Alternative F would be greater than under Alternative A. Livestock grazing would be allowed on 29,837,200 acres in GRSG habitat annually for a total of 828,900 AUMs annually in the planning area. This alternative would rest 25 percent of PPMAs/PGMAs each year. Also, utilization levels would be limited to 25 percent. These actions combined would reduce permitted use drastically in PPMAs/PGMAs. Range improvement construction would increase due to the need to fence out PPMAs/PGMAs areas from grazing use on adjacent areas.

Impacts from Wild Horse and Burros Management

Same as Alternative A.

Impacts from Vegetation Restoration and Weed Control

Similar to Alternative A.

Impacts from Climate Change

Similar to Alternative A.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Impacts from riparian and water resources management would be greater than Alternative A. Changes to permitted use would most likely occur in allotments with current hot season grazing use on riparian areas. Additional range improvements would be constructed to facilitate riparian management.

Impacts from Recreation Management

Same as Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Impacts from CTTM would be greater than Alternative A. This alternative mirrors Alternative B.

Impacts from Fire and Fuels Management

Impacts from Alternative F would be similar to the impacts described under Alternative A.

Impacts from Renewable Energy Management

Impacts from renewable energy management would be less than under Alternative A. Alternative F applies restrictions to 20.5 million acres.

Impacts from Salable Minerals

Same as Alternative A.

Impacts from Locatable Minerals

Impacts from locatable minerals management would be less than under Alternative A. Greater acreage withdrawn from mineral entry would result in less disruption to livestock grazing.

Impacts from Non-energy Leasable Minerals

Impacts on livestock grazing would be less than under Alternative A. Approximately 17,732,900 acres would be closed so disturbance would not occur on these acres. Few reductions in permitted use and few restrictions on range improvement construction would occur.

Impacts from Fluid Minerals (Oil, Gas, Geothermal)

Same as Alternative A.

Impact of Unleased Fluid Mineral

Impacts would be less than under Alternative A. Impacts would be similar to Alternative C; however, there is no blanket prohibition on livestock grazing under this alternative. In PPMAs/PGMAs open to grazing and closed to fluid mineral leasing, there would be no impact on current permitted use and opportunities to construct and maintain range improvements.

Impacts from Lands and Realty

Impacts would be less than under Alternative A. This alternative is similar to Alternative C. Reductions in permitted use, restrictions on maintenance of range improvements, and changes in timing, duration, or frequency of use would be less than Alternative A.

Impacts from Areas of Critical Environmental Concern (ACECs) and Forest Service RNAs

Impacts would be greater than under Alternative A. ACEC acreage is increased over Alternative A. ACECs would be designated with objective of creating “sagebrush reserves to conserve GRSG and other sagebrush-dependent species.” Grazing use would be altered or eliminated as necessary to create conditions favorable to sage brush dependent species. Reductions in permitted use, restrictions on maintenance of range improvements, and changes in timing, duration, or frequency of use would be greater than Alternative A.

4.10. Recreation

4.10.1. Methods and Assumptions

Indicators

Indicators of impacts on recreation are as follows:

- Change in the number and type of BLM SRPs and Forest Service recreation permits issued within the planning area.
- Change in the types of recreation activities and opportunities within the planning area.

Assumptions

The analysis includes the following assumptions:

- The demand for general recreation on BLM-administered and Forest Service-administered lands would continue to increase over the life of the Resource Management Plan and the Land and Resource Management Plan.
- Outdoor recreation will continue to be an important component of the local economy.
- Management actions to preserve GRSG habitat would affect a variety of resources and uses, which may improve some recreation opportunities and experiences, depending on the type of recreation.
- Outside of SRMAs, the BLM will manage for recreation activities that consist mostly of dispersed activities where users informally participate in activities individually or in small groups.
- Demand for SRPs will remain steady or gradually increase over time.

The BLM will continue to issue SRPs on a discretionary basis.

4.10.2. Nature and Type of Effects

This section analyzes potential impacts on recreation resources from proposed management actions of other resources and resource uses. Existing conditions concerning recreation are described in **Section 3.9**, Recreation.

Direct impacts on recreation are those that allow, restrict, or prohibit opportunity, including both the opportunity for access (e.g., public closure) and opportunity to engage in specific activities (e.g., camping, shooting, and all-terrain vehicle riding). Indirect impacts are considered to be

those that alter the physical, social, or administrative settings. Impacts on settings can either be the achievement of a desired setting or the unwanted shift in setting, such as to either a more primitive or urban environment. Physical, social, and administrative settings are not specifically managed for in areas not designated as Recreation Management Areas, although these areas do still provide intrinsic recreation values and opportunities.

The indicator typically used to describe the impact on these areas is the availability of opportunities as described by either acreage restrictions or specific activity prohibitions. For areas managed as SRMAs, both availability of recreation opportunities (activities and desired outcomes) and changes to physical, social, and administrative settings are used as indicators of impacts.

This discussion analyzes the impacts that proposed management decisions would have on managing recreation settings and the targeted outcomes. For areas managed as ERMAs, both availability of activity opportunities and changes to the qualities and conditions (settings) are used as indicators of impacts. This discussion also analyzes the impacts that proposed management decisions would have on managing recreation and the prescribed setting conditions. Since visitor use patterns are difficult to estimate and depend on many factors beyond the scope of management (e.g., recreation trends and economy), qualitative language—for example, “increase” or “decrease”) is generally used unless quantitative visitor use data is available to describe anticipated impacts.

Implementing management for the following resources would have negligible or no impact on Recreation and are therefore not discussed in detail: riparian and water resources, vegetation and soils management, livestock grazing, fire and fuels management, wild horse and burro management, climate change, leasable and locatable minerals, and renewable energy.

4.10.3. Impacts Common to All Alternatives

Impacts from Special Designations Management

Recreation management objectives would follow the appropriate management actions from Wilderness, WSAs, NHTs, NCAs, or WSR management plans.

4.10.4. Alternative A

Impacts from Greater Sage-Grouse Management

Under Alternative A, existing recreation opportunities in the planning area would be maintained.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative A, existing motorized recreational opportunities in the planning area would be maintained.

4.10.5. Alternative B

Impacts from Greater Sage-Grouse Management

Under Alternative B, only BLM SRPs and Forest Service recreation permits that have neutral or beneficial effects would be allowed in approximately 12,693,500 acres of PPMAs. This may

restrict some types of permitted uses. As a result, some types of permitted activities (e.g., OHV races) that could negatively affect PPMAs may be impacted resulting in fewer opportunities to engage in those types of events and activities in those areas.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative B, the OHV area designation would change 8,878,900 acres from open to limited in PPMAs. The restriction on cross-country travel may impact some motorized recreation, such as OHV exploration which depends on unrestricted travel. Opportunities for non-motorized recreation, such as hiking, horseback riding, and hunting, in a more natural or primitive setting may be expanded and enhanced.

4.10.6. Alternative C

Impacts from Greater Sage-Grouse Management

Impacts from Alternative C would be the same as or similar to those under Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative C, the OHV area designation would change 12 million acres from open to limited in PPMAs. The restriction on cross-country travel may impact some motorized recreation, such as OHV exploration which depends on unrestricted travel. Opportunities for non-motorized recreation, such as hiking, horseback riding, and hunting, in a more natural or primitive setting may be expanded and enhanced.

4.10.7. Alternative D

Impacts from Greater Sage-Grouse Management

Under Alternative D, only BLM SRPs and Forest Service recreation permits that have neutral or beneficial effects in approximately 17,732,900 acres of both PPMAs and PGMAs would be allowed. As a result, some types of permitted activities (e.g., OHV races) that could negatively affect PPMAs/PGMAs may be impacted, resulting in fewer opportunities to engage in those types of events and activities in those areas.

Impacts from Comprehensive Travel and Transportation Management

Impacts from Alternative D would be the same as or similar to those under Alternative C.

4.10.8. Alternative E

Impacts from Greater Sage-Grouse Management

Impacts from Alternative E would be the same as or similar to those under Alternative D.

Impacts from Comprehensive Travel and Transportation Management

Impacts from Alternative E would be the same as or similar to those under Alternative C and D.

4.10.9. Alternative F

Impacts from Greater Sage-Grouse Management

Under Alternative D, only BLM SRPs and Forest Service recreation permits that have neutral or beneficial effects on approximately 17,732,900 acres in both PPMAs and PGMAs would be allowed. As a result, some types of permitted activities (e.g., OHV races) that could negatively affect PPMAs/PGMAs may be impacted, resulting in fewer opportunities to engage in those types of events and activities in those areas. Additional management actions that would seasonally prohibit camping and other non-motorized recreation activities within four miles of active leks would decrease the area available for recreational opportunities such as camping, mountain biking, and hiking, resulting in seasonal reductions in recreational opportunities.

Impacts from Comprehensive Travel and Transportation Management

Impacts from Alternative F would be the same as or similar to those under Alternatives C and D.

4.11. Travel and Transportation Management

4.11.1. Methods and Assumptions

Indicators

Indicators of impacts on CTTM are as follows:

- Change in the acreages designated as open, limited, or closed to motorized travel.
- Change in the types of transportation activities occurring on routes that may impact GRSG or habitat.
- Change in the number of acres where new authorized road development would be allowed.
- Change in management activities or public use that would necessitate changing the size of the disturbance footprint of routes.

Assumptions

The analysis includes the following assumptions:

- The demand for general access to travel routes on BLM-administered and Forest Service-administered lands would continue to increase over the life of the LUP.
- Administration of updated agency travel management policy, rules and planning and design guidelines will change public land travel systems through planning and design, making them more sustainable and minimizing potential impacts on resources.
- The designation of individual routes is an implementation-level process and not considered as part of a planning level process.
- Travel management planning can be carried out in conjunction with an LUP process or deferred.

- Travel systems are dynamic and will be changed through subsequent implementation level planning efforts in order to respond to the needs of the BLM and Forest Service multiple-use mission.
- Implementation of a travel management plan would include increased public education, signing, enforcement, and resource monitoring in regard to travel management.

There would be no change to areas where travel management has been completed.

4.11.2. Nature and Type of Effects

This section discusses impacts on CTTM from proposed BLM management actions. Existing conditions concerning CTTM are described in **Section 3.10**, Comprehensive Travel and Transportation Management. Travel and transportation management supports and helps achieve the objectives of other resource programs. Consequently, the travel designations would adhere to the management prescriptions included under each alternative, while following the theme of each alternative.

At the resource management planning level, impacts on CTTM are those that restrict travel (e.g., managing areas as closed or limited to motorized travel and seasonal travel limitations). New CTTM actions in response to GRSG habitat protection strategies would impact the number of acres where motorized travel is allowed.

Travel management decisions may impact other resource areas, such as the closure or limitation of travel to protect sensitive resources. As such, impacts of travel management actions on other resources and uses are discussed in the respective resource sections of this chapter. Impacts on CTTM from other program areas do occur and are considered as part of implementation level transportation management planning.

Implementing management actions for the following resources would have negligible or no impact on CTTM and are therefore not discussed in detail: riparian and water resources, vegetation and soils management, livestock grazing, fire and fuels management, wild horse and burro management, climate change, leasable and locatable minerals, renewable energy, and recreation.

4.11.3. Impacts Common to All Alternatives

Impacts from Special Designations Management

Comprehensive travel and transportation management objectives would follow the appropriate management actions from Wilderness, WSAs, NHTs, NCAs, or WSR management plans.

4.11.4. Alternative A

Impacts from Greater Sage-Grouse Management

Under Alternative A, existing travel opportunities in the planning area would be maintained. Approximately 12,745,000 acres would remain open to unrestricted cross-county motorized travel. Approximately 4,113,300 acres would remain limited to existing or designated routes. Approximately 874,400 acres would remain closed to motorized use. New road construction,

upgrading of existing roads and realignments of roads would continue to be allowed in the planning area.

4.11.5. Alternative B

Impacts from Greater Sage-Grouse Management

Under Alternative B, all GRSG management actions would occur only in PPMAs. The management action that limits motorized travel to existing roads, primitive roads, and trails would change 8,878,900 acres from open to limited in PPMAs. It would prohibit upgrading of existing routes that would change the route category. Route construction would be limited to realignments of existing routes that minimize impacts on PPMAs. The 3 percent disturbance threshold could restrict the amount of new routes that could be constructed; any routes constructed in excess of the disturbance cap would require mitigation necessary to offset the resulting loss of habitat. The impacts from implementation actions, such as evaluating the need for permanent or seasonal road closures, activity-level travel plans, limiting new route construction, and restoration of routes in PPMAs could only be evaluated during implementation. The impacts from these implementation actions would be analyzed in subsequent NEPA documents.

4.11.6. Alternative C

Impacts from Greater Sage-Grouse Management

Under Alternative C, GRSG management actions would occur on PPMAs. The management action that limits motorized travel to existing road, primitive roads and trails would change 12,744,900 acres from open to limited in PPMAs. The impacts from implementation actions, such as evaluating the need for permanent or seasonal road closures in PPMAs could only be evaluated during activity-level travel planning. The impacts from these implementation actions would be analyzed in subsequent NEPA documents.

4.11.7. Alternative D

Impacts from Greater Sage-Grouse Management

Under Alternative D, GRSG management actions would occur on PPMAs and PGMAs. The management action that limits motorized travel to existing road, primitive roads and trails would change 12,744,900 acres from open to limited in PPMAs/PGMAs. Upgrading of existing routes that would change the route category would be prohibited. Route construction would be limited to realignments of existing routes that minimize impacts on PPMAs/PGMAs. The impacts from implementation actions, such as evaluating the need for permanent or seasonal road closures in PPMAs/PGMAs could only be evaluated during activity-level travel planning. The impacts from these implementation actions would be analyzed in subsequent NEPA documents.

4.11.8. Alternative E

Impacts from Greater Sage-Grouse Management

Impacts from Alternative E would be the same as or similar to those under Alternative D.

4.11.9. Alternative F

Impacts from Greater Sage-Grouse Management

Impacts from Alternative F would be the same as or similar to those under Alternative D, except Alternative F would further restrict the construction of new routes by not allowing new routes within a four-mile buffer from leks.

4.12. Land Use and Realty

4.12.1. Methods and Assumptions

This section discusses impacts on lands and realty from proposed management actions of other resources and resource uses. Existing conditions concerning lands and realty are described in **Section 3.11**, Lands and Realty.

Indicators

- Acres of BLM- and Forest Service-administered surface ownership, which includes federal surface with private minerals, in the planning area.
- Acres of BLM- and Forest Service-administered surface ownership affected by ROW and SUA restrictions (i.e., avoidance or exclusion areas).
- Number, acres/miles, and types of surface-disturbing ROWs, leases, permits, and authorizations including communication sites within PPMAs and /PGMAs.
- Number/acres and type of land tenure adjustments/landownership adjustments (i.e., lands identified as suitable for disposal, withdrawal, acquisition, exchange, purchase, donation, or ROW acquisition) within PPMAs and PGMAs.
- Number of BLM and Forest Service proposed permits/ authorizations within PPMAs/PGMAs.

Assumptions

- Authorized ROWs and communication sites would be managed to protect valid existing rights, as long as those ROWs are in compliance with the terms and conditions of their ROW grant.
- Upon renewal, assignment, or amendment of existing ROWs, permits, and leases, additional stipulations could be included in the land use authorization.
- Existing ROWs, designated utility corridors, and communication sites would be managed to protect valid existing rights.
- Demand for small distribution facilities to extend and upgrade services, such as communication sites and utilities, is anticipated to increase as rural development occurs on dispersed private parcels and parcels identified for disposal within the planning area.
- Private parcels within the planning area and parcels identified for disposal would continue to require new or upgraded services such as power distribution facilities, including communication sites, roads, and any appurtenant utilities.

- 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 (Ellis 1984). Mitigation in the form of burying lines or including non-perching design features on lines reduces perching opportunities and subsequent impacts on GRSG (Connelly et al. 2000a) and would be encouraged.
- The number of ROW applications for new communication and computer technology, such as fiber optic cable would continue to increase.
- Management of all previously withdrawn land from entry, appropriation, or disposal under the public land laws on BLM-administered and Forest Service-administered lands would continue. The BLM and the Forest Service would review withdrawals as needed and when necessary, make recommendations for extensions, modifications, revocations, or terminations. All existing withdrawals initiated by other agencies, such as the US Bureau of Reclamation or the Department of Energy, would be continued unless the initiating agency or BLM or Forest Service requests that the withdrawal be revoked.
- Any lands that become unencumbered by withdrawals or classifications will be managed according to the decisions made in the LUP. If the LUP has not identified management prescriptions for these lands, they will be managed in a manner consistent with adjacent or comparable public lands within the decision area. If the unencumbered lands fall within two or more management scenarios where future-planning criteria may not be clear, a plan amendment may be required.
- Linear ROW widths vary based on the nature of the development contained within the ROW, as well as potential impacts on resources.
- The existing designated ROW corridors within the decision area include the Western Utility Group updates to the Western Regional Corridor Study, Section 368 Energy Policy Act of 2005, and West-wide Energy Corridor Programmatic EIS (BLM 2009a), which are adopted. Designated transportation and utility corridors include linear ROWs (e.g., electric transmission facilities, pipelines, communication lines, and transportation systems).
- ROW and SUA holders may continue their authorized use as long as they are in compliance with the terms and conditions of their grant/permit.
- The demand for both energy and non-energy types of ROWs are anticipated to remain steady or gradually increase over time.
- Little to no solar energy ROWs are anticipated due to low solar energy potential in the planning area
- Demand for small distribution facilities to extend and upgrade services, such as communication sites and utilities, is anticipated to increase as rural development occurs on dispersed private parcels within the planning area.
- Public lands would continue to be available for regional and interstate transmission lines, particularly those needed to transport renewable energy.
- Maintaining and upgrading existing utilities, communication sites, and other ROWs and colocation of new infrastructure in existing ROWs is preferred before construction of new

facilities in the planning area, but only if the upgrading can be accommodated within the existing ROW.

- The BLM and Forest Service recognize that colocation does not eliminate the possibility of new temporary or permanent surface disturbance.

ROW authorizations and SUAs in avoidance areas typically result in mitigation to offset the impact of the proposed development. Mitigation can include design criteria, on-site surface disturbance mitigation, off-site mitigation, or a combination thereof.

4.12.2. Nature and Type of Effects

Resources and resource uses affect the lands and realty program by prescribing ROW/SUA exclusion and avoidance areas, stipulations in order to protect resources, and permit conditions associated with Forest Service SUA and BLM ROW grants. Forest Service forest plan prescriptions are similar to BLM ROW exclusion and avoidance areas. Prescriptions can restrict or prohibit certain uses in a planning area. It should also be noted that the Forest Service grants SUAs, while the BLM grants ROWs on their respective agency lands. A ROW exclusion area is one that is not available for new ROW location; SUA authorization would not be allowed on Forest Service-administered lands. A ROW avoidance area may be available for ROW location but may require special stipulations. ROW applications or SUAs could be submitted in ROW avoidance areas; however, a project proposed in these areas may be subject to additional requirements, such as resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, timing limitations, and rerouting. Such requirements could restrict project location or they could delay availability of energy supply (by delaying or restricting pipelines, transmission lines or renewable energy projects), limit future access, delaying or increasing the cost of energy supplies, or they could delay or restrict communications service availability. As a result of special surveys and reports, alternative routes may need to be identified and selected to protect sensitive resources, such as GRSG habitat. Designating ROW exclusion and avoidance areas and applying special stipulations would result in increased application processing time and costs due to the potential need to relocate facilities or due to greater design, mitigation, and siting requirements. The Forest Service screening process for SUAs would ‘reject’ application in exclusion areas.

Co-locating transmission development infrastructure in existing ROWs or Forest Service easements and existing disturbed areas reduces land use conflicts and additional land disturbance. Co-location policies also clarify the preferred locations for utilities and simplify processing on BLM- and Forest System- administered lands. However, collocating can limit options for mineral development and selection of preferable locations for ROWs.

Travel management actions may involve closing areas or specific routes to motorized or mechanized travel, thereby creating areas that are impractical for some types of land uses, such as transmission lines or communication sites.

Most past activities are anticipated to continue at a similar or increased level in the foreseeable future. Surface-disturbing activities may contribute to route restrictions and alterations as some area and existing routes and trails become more heavily traveled; in addition, non-motorized opportunities may be reduced as more development occurs. New routes could increase access to remote areas that were previously inaccessible by motorized vehicles. Accessibility to BLM and Forest Service -administered lands may change as land acquisitions and disposals continue.

Land tenure adjustments/landownership adjustments are intended to maintain or improve the efficiency of BLM and Forest Service management, including management of GRSG habitat. Land disposal as well as exchange, purchase, donation, and ROW acquisition can result in a more contiguous decision area, thus increasing BLM-and Forest Service-administered lands management efficiency. However, while consolidation may be beneficial for certain resources and uses, it may not necessarily reduce effects on GRSG habitat.

Implementing management for the following resources would have negligible or no impact on land use and realty and are therefore not discussed in detail: range management, mineral split-estate, fire and fuels management, and habitat restoration/vegetation management.

4.12.3. Impacts Common to All Alternatives

Impacts from Comprehensive Travel and Transportation Management

Under all alternatives, the BLM would complete a CTTM plan, designating certain routes as open, closed or limited to motorized travel. While the BLM would not close access to valid existing rights, travel management decisions that make access to existing or desirable future ROW locations more difficult would discourage co-location in existing ROWs and new ROW development. Forest Service would implement their Travel Management Plans and would not vary by alternative or resource.

In some areas, there is a high concentration of intermixed private and public land, corridors, and oil gas, and geothermal development. In such areas, there would be restrictions on the ability to upgrade or construct new routes.

Seasonal restrictions on travel could impact site accessibility, impact the ability to construct and maintain ROWs, and increase project costs.

Impacts from Special Designations Management

The designation of BLM ACECs and Forest Service Zoological Special Interest Areas would create ROW/SUA exclusion and avoidance areas and SUA prescription areas that could limit the siting of renewable energy development projects and the transmission lines required to connect them to the grid.

The BLM and the Forest Service would continue to manage special designation areas as either ROW/SUA avoidance or exclusion (prescription) areas across all alternatives. Limitations on ROW development in wilderness areas impact the ability of the BLM and Forest Service to accommodate ROW authorization demands within the planning area, particularly in locations where special designation areas separate energy sources (e.g., wind or geothermal) from likely demand centers. Routing transmission lines around exclusion areas could result in a longer ROW with greater surface disturbance and extended BLM/Forest Service processing times.

4.12.4. Alternative A

The No Action Alternative represents Continuation of Present Management for all the sub-regional LUPs considered in this programmatic LUP amendment.

Impacts from Land Use and Realty Management

Under Alternative A, the BLM and Forest Service would continue to grant ROWs and SUAs under current management systems and existing ROWs in the decision area would continue to provide access and utilities for permittees and lease-holders. A total of 114,200 acres would continue to be managed as ROW/SUA avoidance areas, while 276,600 acres would be designated exclusion. All other lands within the decision area would continue to be open for ROW development and SUAs.

BLM- and Forest Service-administered lands would continue to be available for multiple-use and single-use communication sites and road access ROW (or SUAs) on a case-by-case basis pursuant to Title V of FLPMA, and 43 CFR Part 2800 regulations (BLM) and 36 CFR § 251 Subpart B (Forest Service). All new linear ROWs, fiber optic cables, transmission lines, pipelines, and communication sites would be encouraged to locate within designated corridors and existing sites.

All ROW and SUA applications would be reviewed using the criteria of following existing corridors wherever practical and avoiding the proliferation of separate ROWs. Co-location reduces land use conflicts and additional land disturbance and demarcates the preferred locations for utilities; therefore simplifying processing on BLM- and Forest Service-administered lands. Where existing ROW development is not present, co-location requirements can limit options for new ROW development.

Widths in existing corridors vary from 0.5 mile wide up to 3 miles wide. The widths of these corridors would allow for more ROWs to be granted in the major north-south corridor through the planning area.

Land Tenure

Under Alternative A, approximately 331,200 acres (within PPG and PGH) would continue to be available for disposal via sale. Land disposal, which must meet the criteria under FLPMA Section 203 and applicable LUPs, would improve BLM lands and realty program and overall BLM management efficiency. Forest Service has not identified specific lands for exchange or disposal. Disposal or sale of these lands could prevent the BLM and Forest Service from granting ROWs across those properties, and could result in increasing the density of ROWs in other areas intended for retention. Land tenure and land ownership adjustments are intended to maintain or improve the efficiency of BLM and Forest Service management. The Forest Service completes land ownership adjustments (purchase, exchange, donation, and ROW acquisition), while the BLM conducts land tenure adjustments (withdrawals, disposals, and acquisitions).

Impacts from Leasable Mineral Management

Mineral development indirectly impacts the lands and realty program through the requirement for new infrastructure development, such as roadways and communication facilities. In occupied habitat under Alternative A, 16,061,900 acres of fluid mineral leasing (subject to stipulations) would continue to be open to new leasing. New mineral development in open areas would continue to place a demand on the lands and realty program.

Impacts from Locatable Mineral Management

In occupied habitat under Alternative A, 16,061,900 acres of locatable mineral development would continue to be open to new leasing. New mineral development in open areas would continue to place a demand on the lands and realty program.

Impacts from Salable Mineral Management

Mineral development indirectly impacts the lands and realty program through the requirement for new infrastructure development, such as roadways and communication facilities. In occupied habitat under Alternative A, 16,061,900 acres of mineral materials development would continue to be open to new leasing. New mineral development in open areas would continue to place a demand on the lands and realty program.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative A, 12,745,000 acres would be open to motorized travel while the BLM would manage 4,113,300 acres as limited to existing or designated routes and 874,400 acres would be closed. Accordingly, existing transportation routes and those routes designated for motorized travel on Forest Service-administered lands would continue to provide motorized access to ROW infrastructure and communication sites for construction and maintenance with no additional impacts on lands and realty from CTTM. On BLM-administered lands, there are the fewest restrictions on travel under Alternative A and, thus, the least impact on lands and realty. On Forest Service-administered lands CTTM would be the same under all alternatives. Also, this alternative would not impact the lands and realty program on both BLM- and Forest Service-administered lands.

Impacts from Renewable Energy Management

Under Alternative A, no new Renewable Energy ROW exclusion or avoidance areas are proposed for 17,732,900 acres of the decision area. This alternative has the fewest acres subject to restrictions on renewable energy ROW locations, which could result in the greatest number of land and realty actions, as BLM grants ROWs and the Forest Service issues SUAs.

4.12.5. Alternative B

Management under Alternative B would exclude PPMAs from new BLM ROWs or Forest Service SUAs.

Impacts from Greater Sage-Grouse Management

Management actions under Alternative B to protect GRSG habitat would impact lands and realty through the closure of areas to ROW authorizations, additional criteria for land exchanges, and limitations on new mineral development and road construction. Limitations on disposals in designated critical habitat for threatened and endangered species would allow better resource management in these sensitive areas.

Impacts from Land Uses and Realty Management

Under Alternative B, there would be a net ROW exclusion area increase of 12,239,700 acres and a net ROW avoidance area increase of 5,026,300 acres on BLM-administered lands; this would be a 378 percent increase in PPMAs and a 2,633 percent increase in PGMAs compared with Alternative A. The BLM and Forest Service would also take advantage of opportunities to remove, bury, or modify existing power lines within existing ROWs in PPMAs, if possible.

As noted above in Nature and Types of Effects, 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. While management under Alternative B would allow for co-location in exclusion and avoidance areas, there are limitations

as to the amount of infrastructure that can be co-located in a given ROW. Often co-location is not feasible. Therefore, in PPMA under Alternative B, there would be limited to no opportunity for new ROW development. Exclusion areas could result in reconfigurations of line locations and re-engineering of infrastructure such as electrical transmission lines and pipelines.

On BLM-administered lands based on a reasonable foreseeable lands and realty scenario, exclusion area designations within the decision area could preclude or alter the development of 351 pending new transmission lines, new distribution lines, and new communication sites.

In addition, ROW exclusion and avoidance designations could extend processing time for renewals of existing ROW permits, and make siting of new linear or block ROWs more difficult than under Alternative A.

Exclusion and avoidance designations under Alternative B would also result in impacts on the location and design of communication towers on both BLM- and Forest Service-administered lands. To be effective, communication towers are constructed to meet specific height standards as necessary to have line-of-sight with adjacent repeaters. Under Alternative B, modifications to the communication tower network in PPMAs would be limited to expansion of existing facilities. New facilities would be excluded in PPMAs and conditions on tower design (e.g., tower height) applied to towers in general habitat may prevent the effective transmittal of communication signals to adjacent towers.

Land Tenure

Under Alternative B, the BLM and Forest Service would retain public ownership in PPMAs except where land exchanges would result in more contiguous federal ownership patterns or where disposal accompanied by a habitat mitigation agreement or conservation easement would result in more effective management of GRSG habitat. In general habitat, the amount of land available for disposal (331,200 acres within habitat) would be the same as Alternative A. Land disposal would be subject to the criteria in FLPMA Section 203. The Forest Service has very limited authority to sell or otherwise dispose of National Forest System lands. Most authorities allowing the sale of lands have specific criteria or identify only a small number of properties for sale or disposal in a limited geographical area. The tool used most often for conveyance of lands within National Forest boundaries is land exchange.

Additionally, under Alternative B, the BLM would propose for mineral withdrawal 12,693,500 acres within PPMAs. However, withdrawal would be subject to Congressional approval. The BLM would not recommend approval of withdrawals for reasons other than mineral activity. Having these areas identified or withdrawn would facilitate the disposal of land for promoting community development.

Limitations on BLM and Forest Service land tenure and land ownership adjustments, for example restrictions on land disposal to retain GRSG habitat in public ownership, could result in decreased management efficiency. Mineral withdrawal would reduce the number of new ROW authorization requests for infrastructure to support mineral activity.

Additionally, under Alternative B, the BLM would propose all PPMAs for mineral withdrawal (surface and split-estate acres). However, withdrawal would be subject to Congressional approval. The BLM would not recommend approval of withdrawals for reasons other than mineral activity. In withdrawn areas, BLM-and Forest Service-administered lands would not be available for

mineral extraction for a defined time period. Impacts on mineral development are described in **Section 4.15**, Minerals.

Impacts from Renewable Energy Management

Under Alternative B, the BLM would manage 276,600 acres of PPMAs as ROW exclusion for all ROWs, including utility-scale wind and solar energy. Management of PPMAs as ROW exclusion would eliminate the BLM's ability to accommodate any new wind and solar energy development demand in those areas. Where renewable energy resource areas exist within ROW exclusion areas, the likelihood of the same energy development occurring on BLM-administered or Forest Service-administered lands elsewhere in the sub-region is minimal to none.

Additionally, within avoidance areas, mitigation requirements for renewable energy could direct renewable energy development from federal to non-federal lands. Renewable energy development on adjacent private lands would impact the lands and realty program if transmission lines are required to cross public lands.

Impacts from Leasable, Locatable and Salable Mineral Management

BLM and Forest Service management under Alternative B would decrease the demand for new ROW or SUA infrastructure to support new mineral development. Under Alternative B, BLM and Forest Service management to protect GRSG habitat would result in the closure of PPMAs to non-energy leasable minerals, surface coal mining, new sub-surface mining, mineral material sales, and oil and gas leasing. ROWs serving existing mineral development sites would continue to place a small demand on the lands and realty program (e.g., for renewals and applications to upgrade or maintain infrastructure).

Impacts from Comprehensive Travel and Transportation Management

Under Alternative B, the BLM and Forest Service would only allow new roads where access to valid existing rights is necessary and does not currently exist. Construction of new roads to access valid existing rights that are not yet developed would be done using minimum specifications. Limitations on new road construction could make certain areas impractical for new ROW authorizations, particularly in areas not readily accessible via existing roadways as well as the potential for increased cost of construction of the ROW.

Impacts from Renewable Energy Management

Under Alternative B, 276,600 acres of public lands with wind potential would be managed as ROW exclusion areas and would not be open for renewable energy ROW applications.

In total, 5,130,400 acres of lands with wind potential within the decision area would be affected under Alternative B. Approximately 276,600 acres of these lands would be completely unavailable for wind development through ROW exclusion designations and 1,900,900 acres would be substantially restricted through ROW avoidance designations.

Potential future development of renewable energy would be reduced or eliminated within PPMAs/PGMAs. This could force development to occur outside PPMAs/PGMAs and/or on private lands.

4.12.6. Alternative C

Alternative C would designate PPMAs as ACECs. Management under Alternative C would have the greatest impact on the lands and realty program.

New BLM ROWs or Forest Service SUAs would be prohibited in these areas. This alternative limits road construction and prohibits road construction within a four-mile buffer from leks.

Impacts from Greater Sage-Grouse Management

Under Alternative C, new ROWs, including those for wind and solar, would be excluded in all PPMAs (17,732,900 acres); therefore, no areas in GRSG habitat would be open to new ROW development. GRSG management under Alternative C would eliminate the ability of the BLM and Forest Service to accommodate new demand for ROWs or SUAs in GRSG habitat unless new ROWs and SUAs could be collocated with no new disturbance.

Impacts from Land Uses and Realty Management

Impacts would be similar to Alternative B, but would apply to a larger land area and there would be no designated corridors to accommodate new ROW infrastructure. For linear ROWs (e.g., pipelines and transmission lines) this could increase the length of these projects, thus increasing project costs. 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 private and public land, corridors, oil, gas, and geothermal development, and existing authorizations. In these areas, restrictions on the ability to permit ROWs/SUAs and land tenure/land ownership adjustments would have a greater impact than in areas with lesser degrees of intermixed ownership, ROW corridors, minerals development, and existing authorizations. Despite these restrictions, the existing ROW corridor and ROW network would provide opportunities for the collocation of compatible ROWs.

Land Tenure

Under Alternative C, the BLM and Forest Service would retain public ownership in PPMAs. Impacts from land tenure would be the same as Alternative B, with the exception that BLM and Forest Service would propose all PPMAs, including mineral split-estate for mineral withdrawal.

Land tenure and land ownership adjustments would have more restrictions in GRSG habitat and would not allow the disposal of lands to be flexible for consolidation and effective management of other resources.

Impacts from Leasable, Locatable, and Salable Mineral Management

Impacts under Alternative C from mineral development would be the same as Alternative B, with the exception that mineral closures would apply to all PPMAs, including surface and split-estate areas.

Impacts from Comprehensive Travel and Transportation Management

Management under Alternative C would have the greatest impact on the lands and realty program as new road construction would be prohibited within 4 miles of active leks. Because of the density of active lek sites, new road construction on BLM- and Forest Service -administered land

in the planning area would be limited to existing roads within PPMAs. Limitations on new road construction would make certain areas unfeasible for new ROW development, including areas outside PPMAs where ROW development would be excluded. It has the most potential for increased cost of construction of ROWs and increased difficulty to access public and private lands.

Impacts from Renewable Energy Management

Under Alternative C, 17,732,900 acres of PPMAs would be excluded from solar development ROW applications.

In total, 17,732,900 acres of PPMAs would be ROW exclusion areas and would be affected under Alternative C. All of these acres of these lands would be completely unavailable for wind development through ROW exclusion designations since wind energy development is managed through the ROW program.

While the acreage of moderate to high potential for wind energy may occur along mountain ridge tops, potential future development of renewable energy would be reduced or eliminated within PPMAs designated lands. This would force development to occur outside PPMAs and/or on private lands.

Management of PPMAs as a ROW exclusion would eliminate the BLM's ability to accommodate any new wind energy development demand in those areas.

4.12.7. Alternative D

Alternative D would manage PPMAs and PGMAs to reduce fragmentation and enhance connectivity between habitats.

Impacts from Greater Sage-Grouse Management

PPMAs would be designated as ROW and SUA avoidance areas. New ROW projects in PPMAs/PGMAs would be managed for no net unmitigated loss of PPMAs or PGMAs.

Impacts from Land Uses and Realty Management

Under this alternative, PPMAs would be designated as ROW/SUA avoidance areas. The BLM would allow ROWs within these areas to occur if development incorporates specific mitigation measures and stipulations that would result in no net un-mitigated loss of PPMA habitat. These additional restrictions would impact processing time for BLM/Forest Service and increased cost for the applicants. Alternative D would have greater impacts on the lands and realty program than Alternative A, but fewer impacts than Alternatives B and C.

Land Tenure

Management actions that prioritize GRSG habitat for acquisition and limit disposal of these lands would assist the BLM and Forest Service in prioritizing future land tenure and land ownership adjustments. Land tenure and land ownership adjustments are intended to maintain or improve the efficiency of BLM's and Forest Service's management. However, these same actions could reduce the BLM's and Forest Service's flexibility for consolidating public lands for effective management of other resources.

Under Alternative D, approximately 336,200 acres would be no longer suitable for disposal via sale. Disposal and/or acquisitions of public lands would allow for more contiguous federal ownership patterns within the GRSG habitat area, or where a land tenure adjustment would result in a net gain in amount or quality of GRSG habitat.

This alternative allows the most flexibility in acres available for acquisition, disposal, or exchange because there is no management action proposed to retain public ownership of PPMAs.

Impacts from Minerals Management

Mineral development indirectly impacts the lands and realty program through the requirement for new infrastructure development, such as roadways and communication facilities.

Although land use authorizations (ROWs or SUAs) are not necessary for surface occupancy of leased federal lands, ROWs are often required for infrastructure (e.g., pipelines and centralized facilities). In areas closed to leasing, the need for ROWs to access leases would be eliminated. In areas open to leasing, where surface occupancy restrictions would result in decreased development, overall demand for ROWs would also be decreased. In those cases, the demand would continue but may result in increased length and cost of construction of ROWs, due to the requirement to find alternative routes or sites for infrastructure to support development.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative D, 0 acres would be open to motorized travel while the BLM would manage 16,858,200 acres as limited to existing or designated routes. No new roads would be allowed in PPMAs which could restrict motorized access to ROW infrastructure and communication sites for construction and maintenance. No upgrades of existing routes that would expend the existing disturbance footprint would be allowed, except for resource protection or public safety purposes.

Impacts from Renewable Energy Management

Impacts under Alternative D, PPMAs/PGMAs lands would be designated exclusion areas for utility scale wind and solar development. 17,732,900 acres of public lands would be managed as wind ROW exclusion areas and would not be open for Renewable Energy ROW applications. This represents 17,111,900 fewer acres open to wind energy development than under Alternative A. 17,773,300 acres of public lands would be managed as solar ROW exclusion areas. This represents 16,280,500 fewer acres open to solar energy development than under Alternative A.

Potential future development of renewable energy would be reduced or eliminated within PPMAs/PGMAs. This would force development to occur outside PPMAs/PGMAs and/or on private lands.

These limitations on new renewable energy ROWs/SUAs, would limit the BLM and Forest Serviceability to accommodate demand for ROW/SUA development, which in turn could restrict the availability of energy or service reliability for communication systems.

4.12.8. Alternative E

Alternative E proposes to meet both renewable and nonrenewable energy goals and GRSG conservation measures through close coordination with interest groups; focus attention on the

series of transmission corridors currently being studied to consider the longer-term transmission needs required to meet the State and Nation's renewable energy demands.

Impacts from Greater Sage-Grouse Management

Under Alternative E, the BLM/Forest Service would allow ROW/SUA development within GRSG habitat subject to ROW conditions. Impacts under Alternative E would be somewhat greater than Alternative D.

Impacts from Lands Uses and Realty

Under this alternative specific mitigation measures would be set in place to avoid, minimize, and mitigate impacts on leks, nesting, brood-rearing, and wintering habitats. Infrastructure would not be located within 0.6 mile of specific habitat. Traveling along routes would be limited to specific times that least impact habitats. These increased measures would restrict infrastructure development in specific areas and would impact management and maintenance of existing and future development.

Land Tenure

There would be no impact on lands and realty from land tenure/land ownership adjustment requirements under Alternative E.

Impacts from Mineral Management

New or expanded mineral development, which places a demand on the lands and realty program through applications for ROW authorizations, would be allowed under Alternative E, with stipulations to mitigate impacts on GRSG populations. While the stipulations may extend BLM/Forest Service processing times for mineral development projects, impacts on lands and realty under Alternative E from mineral development would be greater than Alternative D due to an equivalent amount of land available for mineral development.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative E, 12,745,000 acres would be open to motorized travel while the BLM would manage 4,113,300 acres as limited to existing or designated routes.

Impacts from Renewable Energy Management

The strategy for management of renewable energy under Alternative E would avoid conflict with GRSG by locating facilities and activities in non-habitat wherever possible. This alternative would have similar impacts as Alternative A.

Potential future development of renewable energy would be reduced or eliminated within PPMAs/PGMAs. This would force development to occur outside PPMAs/PGMAs and/or on private lands.

Determining lands of "non-habitat" would allow the BLM and Forest Service to be more transparent on lands that have fewer restrictions to future development. Renewable energy companies would know what lands are available and open to development.

4.12.9. Alternative F

Impacts from Greater Sage-Grouse Management

Under Alternative F, new ROWs and SUAs, including those for wind and solar, would be excluded in all PPMAs (17,732,900 acres); therefore, no areas in GRSG habitat would be open to new ROW development. Impacts on ROW authorizations would be similar to Alternative B, but would apply to a larger land area and there would be no designated corridors to accommodate new ROW infrastructure.

ROWs or SUAs, such as roads and transmission lines to the anticipated projects in the sub-region, would be similarly affected by the change in designation. New authorizations would have to be collocated only if the entire footprint of the proposed project (including construction and staging) could be completed within the disturbance associated with the authorized ROW grants or SUAs.

Impacts from Land Uses and Realty Management

Limitations on new ROWs or SUAs and aboveground linear features, such as transmission lines, would limit the BLM and Forest Service's ability to accommodate demand for ROW development. This, in turn, could restrict the availability of energy or service availability and reliability for communication systems.

Land Tenure

The BLM and Forest Service would retain public ownership in PPMAs with no exceptions. Impacts from land tenure and land ownership adjustments would be the same as Alternative B, except that the BLM would propose all PPMAs, including mineral split-estate, for mineral withdrawal.

Impacts from Leasable, Locatable and Salable Mineral Management

Impacts under Alternative F from mineral development would be the same as Alternative B, with the exception that mineral closures would apply to all PPMAs, including surface and split-estate areas.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative F, BLM and Forest Service management would prohibit new road construction or upgrades to existing roads within 4 miles of active leks. Because of the density of active lek sites, new road construction on BLM- and Forest Service-administered land in the planning area would be limited to 17,732,900 acres of PPMAs/PGMAs habitat. Limitations on new road construction would make certain areas unfeasible for new ROW development, including areas outside PPMAs where ROW development would be excluded.

Impacts from Renewable Energy Management

Under Alternative F, 17,732,900 acres of public lands would be managed as ROW exclusion areas and would not be open for renewable energy ROW applications. This represents 17,111,900 fewer acres open to wind energy development than under Alternative A.

Potential future development of renewable energy would be reduced or eliminated within occupied habitat. This would force development to occur outside occupied habitat and/or on private lands.

By determining exclusion areas and standards, the BLM and Forest Service would be more transparent regarding lands that have fewer restrictions to future development. Renewable energy companies would know what lands are available and open to development.

4.13. Renewable Energy Resources

BLM-administered and Forest Service-administered lands are used for a variety of purposes. Major focus areas for the renewable energy program are wind and solar ROW grants and SUAs and to be responsive to applications for renewable energy sites and associated ROWs, as encouraged by current policy. Although geothermal is a resource considered under the renewable energy program, it is discussed under the leasable minerals section. The renewable energy program potentially would be affected by management actions within the resource programs of each office.

Identification of areas as having high potential for renewable energy does not mean these lands would be developed. The feasibility of development would be determined by project proponents, and all applications for land use authorizations would be subject to site-specific NEPA analysis.

Currently, and in the reasonable foreseeable future, there is no and will be no significant commercial biomass energy economy, other than for incidental use as a firewood fuel, in California and Nevada.

This section discusses impacts on renewable energy from proposed management actions of other resources and resource uses. Existing conditions concerning lands and realty are described in **Section 3.12**, Renewable Energy Resources.

4.13.1. Methods and Assumptions

- Number and acres of existing ROW exclusion/avoidance areas within PPMAs/PGMAs.
- Number and acres of existing solar energy zones with PPMAs/PGMAs.
- Acres of “good” or better wind potential within ROW exclusion and avoidance areas/prescription areas that restrict or prohibit certain uses.
- Number of authorized Type II ROW grants/SUAs within PPMAs/PGMAs and within PPMAs/PGMAs buffer zones (as determined by wildlife specialist)
- Number of authorized Type III ROW grants/SUAs within PPMAs/PGMAs and within PPMAs/PGMAs buffer zones (as determined by wildlife specialist).
- Number of permits/authorizations and proposed permits/authorizations within PPMAs and PPMAs/PGMAs and within PPMAs/PGMAs buffer zones (as determined by wildlife specialist).
- Application of COAs on existing, pending, and future wind and solar projects to improve conservation efforts of the GRSG and its habitat.

Assumptions

The analysis includes the following assumptions:

- Renewable energy resources include solar, wind, (geothermal is discussed under leasable minerals) and biomass facilities. Biomass projects are authorized under the timber regulations, unless a new facility is being authorized for biomass production.
- “Good” or better wind potential is classified as wind speeds of 7.0 meters/second at 50 meter height or at wind power density of above 400 watts/meter (NREL 2012).
- Existing ROWs may be modified on their renewal, assignment, or amendment if the requested actions meet the objectives of the amended LUP.
- ROW/SUA holders may continue their authorized use as long as they are in compliance with the terms and conditions of their grant.
- Technological advancements, such as enhanced/engineered renewable energy systems, could lead to changes in levels of development potential throughout the planning area.
- Valid existing renewable energy ROWs would be managed under the stipulations in effect when the ROWs were issued; new stipulations proposed under this LUPA would apply only to new ROWs.
- Upon renewal, assignment, or amendment of existing ROWs, permits, and leases, additional stipulations or modifications could be included in the land use authorization if the request action meets the objective of the amended or revised LUP.
- Existing ROWs, designated utility corridors, and communication sites would be managed to protect valid existing rights.
- Demand for small distribution facilities to extend and upgrade services, such as communication sites and utilities, is anticipated to increase as rural development occurs on dispersed private parcels and parcels identified for disposal within the planning area.
- Private parcels within the planning area and parcels identified for disposal would continue to require new or upgraded services such as power distribution facilities, including communication sites, roads, and any appurtenant utilities.
- The number of ROW/SUA applications for new communication and computer technology, such as fiber optic cable would continue to increase.
- 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 in the existing ROW.
- Co-location of new infrastructure in existing ROWs is preferred over creating a new ROW. The BLM and Forest Service recognize that co-location does not necessarily prevent new temporary or permanent surface disturbance.
- Federal energy policy (42 USC §13201 et seq.), would continue to support domestic energy production, including renewable energy such as wind and solar.
- BLM-administered and Forest Service-administered lands would continue to be available for regional and interstate transmission lines, particularly those needed to transport renewable energy.

- Management of all previously withdrawn land from entry, appropriation, or disposal under the public land laws on BLM-administered and Forest Service-administered lands would continue. The BLM and Forest Service would review withdrawals as needed and when necessary, make recommendations for extensions, modifications, revocations, or terminations. All existing withdrawals initiated by other agencies, such as the Bureau of Reclamation or the Department of Energy, would be continued unless the initiating agency or BLM or Forest Service requests that the withdrawal be revoked.
- The demand for both energy and non-energy types of ROWs are anticipated to remain steady or gradually increase over time due to economic growth and state and local government usage.
- Distributed solar energy development may occur during the life of the LUP but would be localized and the number of associated ROW authorizations is anticipated to be minimal.
- Any lands that become unencumbered by withdrawals or classifications will be managed according to the decisions made in the LUP. If the LUP has not identified management prescriptions for these lands, they will be managed in a manner consistent with adjacent or comparable public lands within the decision area. If the unencumbered lands fall within two or more management scenarios where future-planning criteria may not be clear, a plan amendment may be required.

New information may lead to changes in delineated GRSG habitat. New habitat areas, or areas that are no longer habitat, may be identified. These adjustments would typically result in small changes to areas requiring the stipulations or management actions stated in the LUP. Modifications to GRSG habitat would be updated in the existing date inventory through plan maintenance.

4.13.2. Nature and Type of Effects

Resources and resource uses affect the lands and realty program by prescribing ROW/SUA exclusion and avoidance areas and stipulations in order to protect resources. A ROW/SUA exclusion area is one that is not available for new ROW location under any conditions. In a ROW/SUA avoidance area, new ROW development would ideally be avoided; however, the area may be available for ROW location subject to special stipulations, such as resource surveys and reports, construction and reclamation engineering, long-term monitoring, special design features, special siting requirements, timing limitations, and rerouting. Such requirements could restrict project location, delay availability of energy supply (by delaying or restricting pipelines, transmission lines or renewable energy project), or they could delay or restrict communications service availability.

Forest Service Forest Plan prescriptions are similar to BLM exclusion and avoidance areas as in these areas certain uses are restricted or prohibited. Additionally, the Forest Service grants SUAs on Forest Service-administered lands. The Forest Service grants SUAs, while the BLM grants ROWs on their respective agency lands.

For renewable energy resources, impacts on anticipated projects would only occur as a result of a change in management of BLM-administered and Forest Service-administered lands in the planning area in California and Nevada.

The primary impact issues associated with renewable energy development are directly related to the large surface area needed for wind and solar facilities, and infrastructure. Areas that are suitable for renewable energy development are limited to those areas where these resources

occur. Thus, conflicts with other resources would have the potential to reduce areas deemed available for development.

Other impacts on renewable energy development generally occur in areas where transportation and utility corridors as well as a solar and wind energy zones exist.

Impacts are also related to the mitigation measures required for specific project siting and special stipulations required for resource protection.

Collocating utilities and other appurtenances within designated corridors would reduce land use conflicts by grouping similar facilities and activities in specific areas and away from conflicting developments and activities. It would also clarify the preferred locations for utilities on BLM-administered and Forest Service-administered lands, would make construction and maintenance of the facilities easier, and would simplify the application processing for new facilities. However, designation of corridors could limit options for ROW and facility design and selection of more-preferable locations.

Renewable energy projects, such as wind farms and concentrated solar power development could be impacted by land use authorizations for power plants, disposals of land resulting in commercial or residential developments, and other lands and realty actions resulting in siting constraints for these large facilities. While the acreage of moderate to high potential for wind energy may occur along mountain ridge tops, these areas are not types of lands typically proposed for disposal.

Land tenure and land ownership adjustments are intended to maintain or improve the efficiency of BLM and Forest Service management, including management of GRSG habitat. Land disposal on BLM-administered land and land exchange, purchase, and donation on Forest Service-administered land can result in a more contiguous decision area, thus increasing efficient management of BLM-administered lands. However, while consolidation may be beneficial for certain resources and uses, it may have a negative effect on GRSG habitat.

Renewable energy projects and electrical transmission projects to connect both wind and solar energy projects to the grid can only occur on lands that are not ROW/SUA exclusion areas. Alternatives with greater ROW/SUA exclusion acreages would have long-term direct impacts on the ability for renewable resources to be developed.

As discussed in **Section 4.15**, Lands and Realty, ROW and SUA applications may be filed within ROW/SUA avoidance areas. As a result of special surveys and reports, alternative routes may need to be identified to protect sensitive resources, such as the GRSG habitat. Designating ROW and SUA exclusion and avoidance areas and applying special stipulations would result in increased application processing time and costs due to the potential need to relocate facilities or due to greater design, mitigation, and siting requirements.

Alternatives with greater ROW/SUA avoidance areas would have short-term direct impacts (e.g., special surveys, reports, and construction and reclamation BMPs) and long-term direct impacts (e.g., potential operation and maintenance requirements) on the economic feasibility of the development of renewable energy resources.

Implementing management for all of the resources, except lands and realty and special designation, would have negligible or no impact on renewable energy.

For renewable resources, impacts on anticipated projects would only occur as a result of the change in management of lands within California and Nevada.

4.13.3. Impacts Common to All Alternatives

Impacts from Comprehensive Travel and Transportation Management

Travel management actions can involve closing areas or specific routes to motorized or mechanized travel, thereby creating areas that are impractical for some types of land uses, such as transmission lines or communication sites. Under all alternatives, the BLM and Forest Service would complete a CTTM plan, designating certain routes as open, closed or limited to motorized travel. While the BLM and Forest Service would not close access to valid existing rights, travel management decisions that make access to existing or desirable future ROW locations more difficult would discourage co-location in existing ROWs and new ROW development.

Impacts from Special Designations Management

The designation of ACECs would create ROW/SUA exclusion and avoidance areas that could limit the siting of renewable energy development projects and the transmission lines required to connect them to the grid. Due to the generally small size and dispersed locations of proposed ACECs, the impact is expected to be small. ACECs located in the southern region of the planning area and areas of special designated, such as wilderness, also would affect the location of renewable energy solar development projects. New roads would not be constructed in designated wilderness and ACECs, reducing impacts on resources protected by these designations. There is a moderate to high wind potential and high solar potential to occur within some of the ACECs, designated wilderness and, WSAs.

Wind and solar power developments would have to be compatible with the management prescriptions for other resources and would be evaluated on a project-specific basis.

4.13.4. Alternative A

The No Action Alternative represents continuation of present management for all the sub-regional LUPs considered in this programmatic LUPA.

Impacts from Greater Sage-Grouse Management

Under Alternative A, 276,600 acres of lands would be affected by wind ROW/SUA exclusion or avoidance areas, and 1,492,800 acres of lands would be affected by solar ROW variance areas. All lands with such potential would continue to be open for ROW and SUA applications on a case-by-case basis.

Exclusions of any additional areas from wind energy development would be determined at the project level as part of the site-specific analyses or through local LUP planning efforts, with opportunities for full public involvement. As required by the Wind Energy Development Program, proposed policies and BMPs and site-specific analyses, including the development of an appropriate monitoring program, would be conducted for any proposed project on BLM-administered lands. The scope and approach for site-specific analyses would be determined on a project-by-project basis in conjunction with input from other federal, state, and local agencies, and interested stakeholders. Through this process, the BLM would develop project-specific stipulations for incorporation into the Plan of Development. Site-specific analyses are beyond the scope of the PEIS.

Renewable Energy applications would be accepted by the BLM and Forest Service under existing policy. However, under Alternative A, GRSG could likely become a federally listed endangered species and the Section 7 Consultation process would be likely to result in substantial project constraints.

Impacts from Land Uses and Realty Management

Under Alternative A, existing ROWs in the decision area would continue to provide opportunities for colocation of new infrastructure. A total of 114,200 acres would continue to be managed as ROW/SUA avoidance areas, while 276,600 acres would be designated exclusion. All other lands within the decision area would continue to be open for ROW development. The continuation of the renewable energy program would have direct impacts on the lands and realty program by allowing new facilities to be constructed and service renewable energy projects.

BLM-administered and Forest Service-administered lands would continue to be available for multiple-use and single-use communication sites and road access ROW on a case-by-case basis pursuant to Title V of FLPMA and 43 CFR Part 2800 regulations. All ROW and SUA applications would be reviewed using the criteria of following existing corridors wherever practical and avoiding the proliferation of separate ROWs.

4.13.5. Alternative B

Alternative B represents the NTT alternative. This alternative would make PPMAs exclusion areas for new BLM ROWs or Forest Service SUAs.

Impacts from Greater Sage-Grouse Management

Under Alternative B, 276,600 acres of public lands with wind potential would be managed as ROW/SUA exclusion areas and would not be open for renewable energy ROW and SUA applications.

In total, 5,130,400 acres of lands with wind potential within the decision area would be affected under Alternative B; 276,600 acres of these lands would be completely unavailable for wind development through ROW/SUA exclusion designations and 1,900,900 acres would be substantially restricted through ROW/SUA avoidance designations.

Potential future development of renewable energy would be reduced or eliminated within PPMAs/PGMAs. This would force development to occur outside PPMAs/PGMAs and/or on private lands.

By determining exclusion areas, the BLM and Forest Service would be more transparent about lands that would have fewer restrictions for future development. Renewable energy companies would know what lands are available and open to development.

Additionally, within avoidance areas, mitigation requirements for renewable energy could direct renewable energy development from federal to non-federal lands. Renewable energy development on adjacent private lands would impact the lands and realty program if transmission lines are required to cross public lands.

Impacts from Land Uses and Realty Management

Under Alternative B, ROWs such as roads, fiber optic, natural gas lines, power substations, power distribution and transmission lines to the anticipated projects in the sub region, would be similarly affected by the change in designation. Facilities would have to be co-located only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs or SUAs. These limitations on new ROWs and above-ground linear features, such as transmission lines, fiber optic, natural gas lines, and power substations, would limit the BLM's and Forest Service's ability to accommodate demand for renewable energy ROW development, which in turn could restrict the availability of energy or service availability and reliability for communication systems.

4.13.6. Alternative C

Alternative C represents the Western Watershed Project Alternative. This alternative would designate PPMAs as ACECs. New BLM ROWs or Forest Service SUAs would be prohibited in these areas.

Impacts from Greater Sage-Grouse Management

Under Alternative C, 17,732,900 acres of PPMAs would be excluded from solar development ROW applications.

In total, 17,732,900 acres of lands would be ROW/SUA exclusion areas and would be affected under Alternative C. All of these acres of these lands would be completely unavailable for wind development through ROW/SUA exclusion designations since wind energy development is managed through the lands and realty program.

While the acreage of moderate to high potential for wind energy may occur along mountain ridge tops, potential future development of renewable energy would be reduced or eliminated within PPMAs. This would force development to occur outside PPMAs and/or on private lands.

Management of PPMAs as a ROW/SUA exclusion would eliminate the BLM's ability to accommodate any new wind energy development demand in those areas. Potential future development of renewable energy would be reduced or eliminated within PPMAs. This would force development to occur outside PPMAs and/or on private lands.

Determining lands of non-habitat would allow the BLM to be more transparent regarding lands that would have fewer restrictions for future development. Renewable energy companies would know what lands are available and open to development.

Impacts from Land Uses and Realty Management

Under Alternative C, ROWs such as roads, transmission lines and to the anticipated projects in the sub region would be similarly affected by the change in designation. Facilities would have to be sited in non-habitat or bundled with existing corridors. These limitations on new ROWs and above-ground linear features, such as transmission lines, would limit the BLM's ability to accommodate demand for renewable energy ROW development, which in turn could restrict the availability of energy or service availability and reliability for communication systems.

4.13.7. Alternative D

Alternative D would manage priority and general habitat to reduce fragmentation and enhance connectivity between habitats. PPMAs/PGMAs would be designated as avoidance areas. New renewable energy projects in PPMAs/PGMAs would be managed to achieve no net unmitigated loss of priority or general habitat. Facilities would have to be sited and developed in non-habitat, bundled with existing corridors, or mitigated so that no PPMAs or PGMA habitat is lost.

Impacts from Greater Sage-Grouse Management

Under Alternative D, PPMAs/PGMAs lands would be designated exclusion areas for utility-scale wind and solar development. Approximately 17,732,900 acres of public lands would be managed as wind ROW/SUA exclusion areas and would not be open for renewable energy ROW applications. This represents 17,111,900 fewer acres open to wind energy development than under Alternative A. Approximately 17,773,300 acres of public lands would be managed as solar ROW/SUA exclusion areas. This represents 16,280,500 fewer acres open to solar energy development than under Alternative A.

Potential future development of renewable energy would be reduced or eliminated within PPMAs/PGMAs. This would force development to occur outside PPMAs/PGMAs and/or on private lands.

These limitations on new renewable energy ROWs, would limit the BLM's ability to accommodate demand for ROW development, which in turn could restrict the availability of energy or service reliability for communication systems.

No net un-mitigated loss of habitat would allow existing industrial wind and solar to develop plans that would allow them to receive a ROW for ancillary facilities (transmission and roads) in PPMAs/PGMAs.

By determining exclusion areas, the BLM and Forest Service would be more transparent on lands that would have fewer restrictions to future development. Renewable energy companies would know what lands are available and open to development.

Impacts from Land Uses and Realty Management

Under Alternative D, all areas in PGMA and PMA would be designated as ROW/SUA avoidance. The BLM and Forest Service would allow ROW development within avoidance areas to occur if the development incorporates appropriate RDFs in design and construction (e.g., noise, tall structure, seasonal restrictions, etc.) and development results in no net unmitigated loss of priority or general habitat. Facilities would have to be sited and developed in non-habitat, bundled with existing corridors, or mitigated so that no PMA or PGMA habitat is lost. These limitations on new ROWs and above-ground linear features, such as transmission lines, would limit the BLM's and Forest Service's ability to accommodate demand for renewable energy ROW development, which in turn could restrict the availability of energy or service availability and reliability for communication systems.

4.13.8. Alternative E

Alternative E represents the State of Nevada Sagebrush Ecosystem Council/Team alternative. This alternative proposes to meet both renewable and non-renewable energy goals and GRSG

conservation measures through close coordination with interest groups and focusing on the series of transmission corridors currently being studied to consider the longer-term transmission needs required to meet the State and Nation's renewable energy demands.

Impacts from Greater Sage-Grouse Management

The strategy for management of renewable energy under Alternative E would avoid conflict with GRSG by locating facilities and activities in nonhabitat wherever possible. This would force development to occur outside occupied and suitable habitat and/or on private lands.

Determining lands of non-habitat would allow the BLM to be more transparent regarding lands that would have fewer restrictions to future development. Renewable energy companies would know what lands are available and open to development.

Impacts from Land Uses and Realty Management

Under Alternative E, impacts would be similar to Alternative A, except decisions would avoid occupied and suitable habitat wherever possible. The BLM and Forest Service would allow ROW development within these areas to occur if new features were located within existing corridors or, at a minimum, co-located with existing linear features. These limitations on new ROWs and above-ground linear features, such as transmission lines, would limit the BLM's and Forest Service's ability to accommodate demand for renewable energy ROW development, which in turn could restrict the availability of energy or service availability and reliability for communication systems.

Under this alternative specific mitigation measures would be set in place to minimize impacts on leks, nesting, brood-rearing, and wintering habitats. Infrastructure would not be located within 0.6 mile of specific habitat. Travel would be limited to specific times that least impact habitats. These increased measures would restrict renewable energy development in specific areas and would impact management and maintenance of existing and future development.

4.13.9. Alternative F

This alternative would make occupied GRSG habitat (PPMAs and PGMAs) exclusion areas for new BLM ROWs or Forest Service SUAs. Wind energy development would be sited at least five miles from the nearest active lek.

Impacts from Greater Sage-Grouse Management

Under Alternative F, 17,732,900 acres of public lands would be managed as ROW/SUA exclusion areas and would not be open for renewable energy ROW or SUA applications. This represents 17,111,900 fewer acres open to wind energy development than under Alternative A.

Potential future development of renewable energy would be reduced or eliminated within occupied habitat. This would force development to occur outside occupied habitat and/or on private lands.

By determining exclusion areas and standards, the BLM and Forest Service would be more transparent on lands that would have fewer restrictions to future development. Renewable energy companies would know what lands are available and open to development.

Impacts from Land Uses and Realty Management

Under Alternative F, ROWs such as roads, fiber optic, natural gas, power distribution and transmission lines to the anticipated projects in the sub-region would be similarly affected by the change in designation. New authorizations would be co-located only if the entire footprint of the proposed project (including construction and staging), can be completed within the existing disturbance associated with the authorized ROWs or SUAs. These limitations on new ROWs and above-ground linear features, such as transmission lines, would limit the BLM's and Forest Service's ability to accommodate demand for renewable energy ROW development, which in turn could restrict the availability of energy or service availability and reliability for communication systems.

4.14. Mineral Resources

4.14.1. Fluid Minerals

Methods and Assumptions

Analysis of impacts on minerals from this LUPA focuses on the impacts of conservation measures to protect GRSG. These impacts may be direct or indirect. For example, a direct impact on fluid minerals would result from closure of an area to fluid mineral leasing. An indirect impact would result from management of an area as ROW/SUA exclusion, which would change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on fluid minerals are described under Indicators, below.

Indicators

Indicators of impacts on GRSG are as follows:

- The amount of land (option: unleased land) identified as closed to fluid mineral exploration and development
- 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/SUA avoidance areas
- The amount of land managed as ROW/SUA exclusion areas

Assumptions

The analysis includes the following assumptions:

- Federal energy policy (42 USC §13201 et seq.), would continue to support domestic energy production, geothermal and oil and gas.
- All future designated ACECs will be closed to mineral leasing.

- Existing fluid mineral leases would not be affected by the closures proposed under this LUPA.
- Fluid mineral operations on existing federal leases, regardless of surface ownership, would be subject to COAs by the authorizing 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.
- Valid existing leases would be managed under the stipulations in effect when the leases were issued; new stipulations proposed under this LUPA would apply only on new leases. See the glossary for definitions of stipulations versus COAs.
- New information may lead to changes in delineated GRS habitat. New habitat areas, or areas that are no longer habitat, may be identified. This adjustment would typically result in small changes to areas requiring the stipulations or management actions stated in this plan. Modifications to GRS habitat would be updated in the existing data inventory through plan maintenance.
- If an area is leased, it could be developed; however, not all leases would be developed within the life of this LUPA.
- As the demand for energy increases, so will the demand for extracting energy resources in areas with potential.
- Stipulations also apply to fluid mineral leasing on lands overlying federal mineral estate, which includes federal mineral estate underlying BLM-administered lands and non-BLM-administered lands. There are 49,868,700 acres of federal mineral estate within the planning area.
- As discussed in **Section 3.13**, Mineral Resources, market circumstances will likely result in continued industry emphasis on increasing oil supplies and searching for additional natural gas supplies in the planning area. Much of the oil and gas supply growth within the planning area is expected to come from production in existing reservoirs, and new nonconventional resources plays.
- As discussed in **Section 3.13**, Mineral Resources, There are new prospective oil and gas plays as well as expansions to existing areas within the planning area. The level of oil and gas exploration activity in the planning area is likely to increase during the life of this planning effort. If any of the plays are determined to be economic, it is anticipated that development within the planning area would also increase.
- As discussed in **Section 3.13**, Mineral Resources, interest in geothermal in Nevada is expected to remain sporadic and be dependent upon market conditions and government incentive programs. However, geothermal exploration and development will continue in areas where resources are identified.

Nature and Type of Effects

The following analysis describes the nature and type of impacts that could affect fluid minerals in the planning area. Details on how the occurrence of each impact would vary by alternative are described under the various subheadings. Closing areas within GRS 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. This could raise the cost of fluid mineral development in the planning area and could result in operators moving to nearby private or state minerals with no such restrictions.

Management actions that prohibit or restrict surface occupancy or disturbance (such as TLs, NSO stipulations, CSU stipulations, and limitations on the total amount of surface disturbance in areas) overlying federal fluid mineral resources would also directly impact the development of those resources by limiting the siting, design, and operations of fluid mineral development projects. This, in turn, could force operators to use more costly development methods than they otherwise might have used. Equipment shortages could result from application of TLs because a bottleneck may be created during the limited time period in which activity would be allowed. In areas where NSO stipulations are applied, federal fluid minerals could be leased, but the leaseholder/operator would have to use offsite methods such as directional drilling to access the mineral resource. The area where directional drilling can be effectively used is limited, meaning some minerals may be inaccessible in areas where an NSO stipulation covers a large area or where no leasing is allowed on surrounding lands.

Applying COAs, which include RDFs (per **Appendix A**) and conservation measures outlined in **Chapter 2 (Table 2-5, Description of Alternative Actions)**, to existing leases would directly impact fluid mineral operations. These RDFs and conservation measures would include standards such as noise restrictions, height limitations on structures, design requirements, water development standards, remote monitoring requirements, and reclamation standards. Application of these requirements through COAs would impact fluid mineral operations by increasing costs if it resulted in the application of additional requirements or use of more expensive technology (such as remote monitoring systems) than would otherwise have been used by operators. To avoid these costs, operators may move to nearby state or private minerals. Impacts from these COAs would be mitigated where exceptions limit their application. This would occur where a COA was not applicable (e.g., a resource is not present on a given site) or where site-specific consideration merited slight variation.

Placing limits on geophysical exploration could reduce the availability of data on fluid mineral resources and could increase costs of fluid mineral development if the limits required use of more expensive technology. Timing limitations on geophysical exploration would delay development activities and could cause equipment shortages because all exploration would be occurring during the same time period.

Requiring master development plans and unitization could cause direct impacts on fluid minerals through increased costs of fluid mineral extraction by delaying the permit approval process until such additional site-specific planning efforts are completed. However, unitization typically has been initiated at the operator's discretion.

Requiring reclamation bonds in the amount necessary to cover full reclamation upon completion of the project could deter fluid mineral exploration and development by increasing up-front costs when these costs could have previously occurred after economic resources had already been recovered. This would be a direct impact on fluid minerals.

Identification of areas in which to acquire additional surface or mineral estate containing GRSG habitat would have no impacts on fluid minerals because it would not result in application of management actions to additional acres of surface or fluid mineral estate. If areas for acquisition were identified, acquisition would occur only in areas containing existing federal mineral leases,

which are already subject to BLM management actions applicable to both the surface and the mineral estate through the fluid minerals program.

Management actions creating ROW/SUA exclusion or avoidance areas could indirectly increase the cost of fluid mineral extraction by limiting the available means for transporting fluid minerals to processing facilities and markets. For example, new natural gas pipelines could not be built in an ROW/SUA exclusion area.

Impacts would be mitigated where exceptions were allowed for co-location of new ROWs within existing ROWs to satisfy valid existing rights. Implementing management for the following resources would have negligible or no impact on fluid minerals and is therefore not discussed in detail: CTTM, recreation, range management, solid minerals, fire and fuels management, habitat restoration, and vegetation management.

Impacts Common to All Alternatives

There are no impacts that would be common to all alternatives.

4.14.1.1. Alternative A

The No Action Alternative represents Continuation of Present Management for all the sub-regional LUPs considered in this programmatic LUP amendment. The No Action Alternative provides the baseline against which to compare other action alternatives and their impacts on resources and resource uses. The No Action Alternative is required by CEQ regulations (40 CFR Parts 1500-1508) implementing the National Environmental Policy Act. As a baseline for comparison, the No Action Alternative is not required to meet the Agency Purpose and Need and; therefore, must be assessed in an environmental impact statement as a basis for comparison.

The LUPs included in this programmatic amendment were developed and approved between 1982 and 2008. These LUPs collectively provide a varying range of goals, objectives, plan decisions, and allocations that reflect the issues at the time of their development. The No Action Alternative would continue implementing management decisions and agency policies under the current approved LUPs within the sub-region. Direction contained in existing statutes, regulations and policies would also continue to be implemented and may at times supplement provisions in existing LUPs.

Impacts from Leasable Minerals Management

As discussed in **Section 3.13**, Mineral Resources, approximately 42,608,800 acres (97 percent) of lands open to geothermal leasing in the decision area is unleased. Leased lands within GRSG habitat are currently subject to existing GRSG stipulations (see **Appendix G**, Leasable Mineral Stipulations, Waivers, Modifications and Exceptions for a description of existing stipulations); existing geothermal leases within GRSG habitat would also be subject to these existing stipulations.

Under Alternative A, it is projected that 243 new exploratory and development wells would be drilled on during the life of the LUP. Of these new wells, 152 are expected to be production wells and 76 would be injection wells; 25 power plants would come online as a result of these successful wells (see **Appendix H**, Reasonable Foreseeable Development Scenarios).

Under Alternative A, BLM COAs and Forest Service stipulations could be applied to mitigate or prevent impacts on BLM-administered lands or other resources. BMPs could be incorporated as COAs. If COAs were applied, impacts would be the same type as those described under Nature and Type of Effects.

Geophysical exploration would continue to be allowed within the decision area.

As discussed in **Section 3.13**, Mineral Resources, approximately 39,961,700 acres (91 percent) of lands open to oil and gas leasing in the decision area is unleased. Leased lands within GRSG habitat are currently subject to existing GRSG stipulations (see **Appendix G**, Leasable Mineral Stipulations, Waivers, Modifications and Exceptions for a description of existing stipulations), and existing oil and gas leases within GRSG habitat would also be subject to these existing stipulations.

Under Alternative A, it is projected that 100 new exploratory and development wells would be drilled on during the life of the LUP. Of these new wells, 48 are expected to be producing oil and gas (see **Appendix H**, Reasonable Foreseeable Development Scenarios).

Under Alternative A, BLM COAs and Forest Service stipulations could be applied to mitigate or prevent impacts on BLM-administered lands or other resources. BMPs could be incorporated as COAs. If COAs were applied, impacts would be the same type as those described under Nature and Type of Effects.

Geophysical exploration would continue to be allowed within the decision area.

Impacts from Lands and Realty

Under Alternative A, the BLM and Forest Service would continue to manage existing exclusion and avoidance areas no additional impacts from lands and realty on fluid minerals.

4.14.1.2. Alternative B

Impacts from Lands and Realty

Under Alternative B, an additional 12,239,700 acres would be managed as ROW/SUA exclusion areas, and an additional 4,932,400 acres would be managed as ROW/SUA avoidance area. This would have the potential to affect fluid mineral exploration and development projects with associated ROWs.

Impacts from Leasable Minerals Management

Under Alternative B, PPMAs would be closed to fluid minerals leasing, including winter concentration areas (Doherty et al. 2008; Carpenter et al. 2010). This stipulation would have the potential to directly affect approximately 11,397,200 acres.

The BLM would also require design features on existing leases. No quantitative percentage limit, surface occupancy buffers, or timing limitation would apply to surface disturbance; rather, surface disturbance would prevent or minimize disturbance to GRSG and their habitat. Unitization would occur on a case-by-case basis.

In addition to RDF and limitations on disturbance, noise limitations and structure height restrictions would apply under Alternative B. Cost impacts of these operating and siting constraints would be the same type as those described under Nature and Type of Effects.

Under Alternative B, geophysical exploration would be permitted within priority GRSG habitat areas with restrictions. These restrictions would likely reduce the amount of geophysical exploration within the decision area, which could reduce the amount of fluid mineral resources that are identified and developed.

Overall, as a result of increased restrictions and limitations as compared to Alternative A, Alternative B would result in an increase in the magnitude and duration of effects on fluid minerals development over time.

4.14.1.3. Alternative C

Impacts from Leasable Minerals Management

Under Alternative C, all PPMAs would be closed to fluid mineral leasing. This would comprise 17,732,900 acres. As a result of no new leasing, no exploration or development would occur. Under Alternative C, the Forest Service and BLM would develop strategies to amend, cancel, or buyout existing leases and close those lands to leasing. This would reduce the existing fluid mineral leases. The BLM would not issue new fluid mineral leases, which would prevent the BLM from complying with federal energy policy (42 USC §13201 et seq.) to support domestic energy production.

Impacts from Land Uses and Realty Management

Under Alternative C, no lands within the decision area would be available for new ROWs. Because federally managed lands are closed to leasing under this alternative, there would be no impacts on public lands. However, Alternative C could decrease development of fluid mineral projects on private lands by decreasing the accessibility and availability to develop infrastructure (e.g., pipelines, transmission lines).

4.14.1.4. Alternative D

Impacts from Leasable Minerals Management

Under Alternative D, lands open and closed to geothermal leasing would be the same as described under Alternative A. However, all federal fluid minerals in PPMAs 12,693,300 acres (29 percent of lands open to fluid mineral leasing) would be open to fluid mineral leasing subject to an NSO stipulation that provides no exception, modification or waiver language. This NSO stipulation would affect 5,904,600 acres of unleased lands with high geothermal potential. These acres make up approximately 14 percent of all the unleased geothermal lands in the decision area.

Lands within PGMAs would also be subject to NSO, but there would be provisions for exceptions, modifications and waivers. There are no lands with high geothermal potential in PGMAs within the decision area.

Under Alternative D, lands open and closed to oil and gas leasing would be the same as described under Alternative A. However, all federal fluid minerals in PPMAs 12,693,200 acres (29 percent of lands open to fluid mineral leasing) would be open to fluid mineral leasing subject to a NSO

stipulation that provides no exception, modification or waiver language. This NSO stipulation would affect 144,300 acres of unleased lands with high oil and gas potential.

Lands within PGMAs would also be subject to NSO, but there would be provisions for exceptions, modifications and waivers. This NSO stipulation would affect 0 acres of (0 percent) unleased lands with high oil and gas potential.

Timing stipulations would be applied to new fluid mineral leases within PPMAs that would limit exploration and development operations during lekking, nesting, and early brood-rearing seasons.

Under Alternative D, geophysical exploration would be permitted within priority GRSG habitat areas with restrictions. These restrictions would likely reduce the amount of geophysical exploration within the decision area, which could reduce the amount of fluid mineral resources that are identified and developed.

Impacts from Land Uses and Realty Management

Under Alternative D, impacts would be the same as Alternative A in all areas except GRSG general and PPMAs, which would be designated as ROW/SUA avoidance. The BLM would allow ROW development within avoidance areas to occur if the development incorporates appropriate RDFs in design and construction (e.g., noise, tall structure, seasonal restrictions, etc.) and development results in no net un-mitigated loss of priority or general habitat. Facilities would have to be sited and developed in non-habitat, bundled with existing corridors or mitigated so that no habitat is lost. These limitations on new ROWs and above-ground linear features, such as transmission lines, would limit the BLM's ability to accommodate demand for fluid mineral ROW development, which in turn could restrict the availability of fluid minerals.

4.14.1.5. Alternative E

Impacts from Leasable Minerals Management

Under Alternative E, development in GRSG habitat would be avoided through the use of stipulations with exception, waiver, and modification language. The impacts on leasable minerals would be less than those described under Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative E, the impacts on fluid minerals would be less than those described under Alternative A.

4.14.1.6. Alternative F

Impacts from Leasable Minerals Management

Under Alternative F, 17,732,700 acres in PPMAs and PGMAs would be closed to geothermal leasing, which would increase impacts on fluid minerals compared with Alternative A. Impacts would be the same type as those described under Nature and Type of Effects.

Oil and Gas

Under Alternative F, 17,732,900 acres in PPMAs (100 percent) and 5,039,400 PGMAs (100 percent) would be closed to oil and gas leasing, which would increase impacts on fluid minerals

compared with Alternative A. Of these lands, 222,500 acres (PPMAs) and 80,300 acres (PGMAs) have high potential. Impacts would be the same type as those described under Nature and Type of Effects.

In addition to applying the restrictive management under Alternative B to more acres, management under Alternative E would call for COAs implementing seasonal restrictions on vehicle traffic and human presence associated with exploratory drilling. This alternative also would limit new surface disturbance on existing leases to three percent per section, with some exceptions. Impacts from these operating and siting restrictions would be the same type as those described under Nature and Type of Effects.

Overall, as a result of increased restrictions and limitations as compared to Alternative A, Alternative F would result in an increase in the magnitude and duration of effects on fluid minerals development over time.

4.14.2. Locatable Minerals

The locatable minerals program is non-discretionary for the BLM and the Forest Service. Within the planning area, all lands are generally open to mineral location under the 1874 Mining Law. There are specific locatable mineral withdrawals for particular ROWs, designated wilderness areas, areas of critical environmental concern and other administrative needs. There are no locatable mineral withdrawals specific to protecting GRSG habitat. All locatable mineral activities are managed under the regulations at 43 CFR Part 3800 or 36 CFR § 228 through approval of a Notice of Intent or a Plan of Operations. Mitigation of effects on GRSG and habitat are identified through the NEPA process approving plans of operation. Goals and objectives for locatable minerals are to provide opportunities to develop the resource while preventing undue or unnecessary degradation of public lands.

Methods and Assumptions

Analysis of impacts on locatable minerals 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 locatable minerals would result from closure of an area to mineral exploration. An indirect impact would result from removal of a road, which would change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on mineral material sales are described under indicators, below.

Indicators

Indicators for impacts on locatable minerals and the measurements used to describe the impacts (where available or appropriate) are described below:

- Actions that reduce availability and opportunity for development of a resource (e.g., mineral withdrawal).
- Amount of federal minerals available versus closed to development. Indirect impacts include loss of production of mineral resource for the public use and for the generation of sale revenues and tax revenues.
- Actions placing restrictions or requirements that reduce efficiency and increase operational costs that could make development infeasible.

- Amount of federal lands with restrictions (e.g., RDFs, PDFs, and TLs) Indirect impacts include reduced production of mineral resources for the public use and for the generation of tax revenues; possible adverse impact of higher cost of accessing portion of lease via more circuitous route for access road, electric utility lines, seasonal limitations to road use, or additional restrictions/requirements on development activities.
- Actions that affect the ability to access minerals.
- Amount of acres or miles that would affect the ability to access mining claims (e.g., ROW exclusions and disturbance caps).
- Adverse impact of restrictions affecting the ability to access minerals that would otherwise be available, including limits to road construction, permanent road closures, avoidance, and exclusion areas.

Assumptions

Assumptions for this analysis include the following:

- Any alternative that limits locatable mineral development (i.e., reduces the area available for development) will have some adverse impact on locatable minerals.
- The 43 CFR § 3809 and 36 CFR § 228, Subpart A, regulations manage surface-disturbing activities on mining claims.
- Mineral operations are sensitive to costs, especially when prices are depressed.
- Validity of mining claims is based on profitability.
- Ability to construct roads and pipelines on private lands to access federal minerals is subject to landowner approval, which is not guaranteed.
- Mineral resources are not evenly distributed across the landscape.
- Operators need predictable continuity of operations before acquiring or developing.
- Development techniques are highly technical and not uniformly applicable.
- A minimum of 5 years is needed for restoration of self-sustaining native grass/forb cover on reclamation.
- A minimum of 10 years is needed for successful establishment or colonization by sagebrush on reclamation.
- Implementing management actions for the following resources or resource uses would have negligible or no impact on locatable minerals and are, therefore, not discussed in detail: recreation management, range management, wind energy development, industrial solar, wild horse management, fluid minerals and solid minerals, non-energy leasable minerals, salable minerals, fuels management, fire operations, ESR, and habitat restoration.

Nature and Type of Effects

Management actions for resources and resource uses could affect potential locatable mineral development when they result in (1) reduced availability of locatable mineral resources, (2)

reduced access to new or existing mines due to restrictions on use of the overlying surface lands, and (3) reduced efficiency and increased operational costs that make potential locatable mineral development economically infeasible.

Impacts Common to All Alternatives

There are no impacts common to all alternatives.

4.14.2.1. Alternative A

This alternative does not designate PPMAs or PGMAs in the planning area. This alternative will have no effect on locatable mineral management.

Under Alternative A, 1,670,800 acres of existing habitat would remain withdrawn from location under the Mining Law of 1872. Exploration and mining would continue to be authorized under the BLM 43 CFR § 3809 surface management and the Forest Service 36 CFR § 228, Subpart A, regulations managing surface-disturbing activities on federal lands.

Under Alternative A, 1,670,800 acres of federal mineral estate would remain withdrawn. Approximately 16,061,900 acres of federal mineral estate would remain open to locatable mineral entry. This alternative would be the least restrictive to locatable minerals because a larger percentage of the planning area would be open to locatable mineral entry and no additional restrictions would be applied to mining operations.

4.14.2.2. Alternative B

This alternative designates PPMAs and PGMAs in the planning area. In PPMAs, this alternative would propose withdrawal from mineral entry based on risk to the GRSG and its habitat from conflicting locatable mineral potential and development.

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

Like Alternative A, under Alternative B, 12,693,500 acres of PPMA would be recommended for withdrawal from location under the Mining Law of 1872. If the Secretary issues a Public Land Order to formally withdraw these lands, subject to valid existing rights, the location of new mining claims under the Mining Law of 1872 would be forbidden. Exploration and mining would be allowed on prior existing, valid mining claims.

Under Alternative B, approximately 4,664,700 acres of PGMA would remain open to locatable mineral entry, while all 12,693,500 acres of PPMA would be recommended for withdrawal from location.

Withdrawal or closure of an area to mining development removes the mineral resources in that area from being able to be accessed and extracted under new claims. Impacts from these actions would be the same type as those described under Alternative A; however, total withdrawals (including lands currently withdrawn) under this alternative would increase 186 percent compared with Alternative A, thereby further limiting opportunities for locatable mineral development in the decision area.

If the Secretary issues a Public Land Order to formally withdraw all lands in PPMAs, as proposed by this alternative, the locatable mining operations in PPMAs would require a validity examination for material changes and additional constraints, such as seasonal restrictions, could be applied.

Once formally withdrawn, existing claims in PPMAs would be subject to validity examinations to determine whether or not the claim was valid prior to the withdrawal, and whether it remains valid, or the existing claims could be bought out.

Under this alternative, BMPs would be mandatory as COAs within PPMAs.

4.14.2.3. Alternative C

This alternative designates 17,732,900 acres of PPMAs in the planning area and would propose withdrawal from mineral entry in GRSG habitat based on risk to the GRSG and its habitat from conflicting locatable mineral potential and development.

Management actions for mineral programs other than locatable minerals would not impact locatable minerals. Impacts from locatable mineral management actions are the same as Alternative B.

4.14.2.4. Alternative D

This alternative designates PPMAs and PGMAs in the planning area. The BLM and Forest Service authorize locatable mineral development under 43 CFR § 3809 and 36 CFR § 228, Subpart A, respectively. This alternative would apply mitigation and GRSG best management practices that minimize the loss of PPMAs through off-site mitigation within the planning area.

Under Alternative D, additional restrictions and design features for locatable minerals may apply in PPMAs and PGMAs. To the extent practicable, surface disturbance could be limited, and enhancements of PPMAs through on-site and/or off-site mitigation could be requested.

4.14.2.5. Alternative E

This alternative designates Occupied, Suitable, Potential, and Non-habitat in the planning area. This alternative incorporates a decision-making policy of “Avoid, Minimize, and Mitigate,” which limits habitat disturbance, manage timing of operations, would apply mitigation and GRSG conservation efforts and aggressively engage in reclamation efforts as projects are completed, and target reclamation where the ecological site potential exists in SGMAs.

Under Alternative E, additional restrictions and design features for locatable minerals would apply in SGMAs. To the extent practicable, surface disturbance would be limited, and enhancements of GRSG habitat through on-site and/or off-site mitigation would be requested.

4.14.2.6. Alternative F

This alternative would have the same effect as Alternative B.

4.14.3. Mineral Materials

The salable minerals program is discretionary for the BLM and the Forest Service. However, within the planning area, most public lands are open to salable mineral material development. Specific closures of areas to salable mineral materials such as ACECs or crucial or essential wildlife habitat exist throughout the planning area. Some LUPs contain use and development restrictions in terms of seasonal timing limitations in relation to GRSG habitat and leks, similar to oil and gas leasing; however, this is not consistent across the planning area. These are identified mostly in the more recent LUPs and use similar buffers (e.g., 2 miles). No LUPs in the planning area contain specific goals, objectives, or management actions relative to conservation or protection of GRSG beyond the use restrictions identified above.

Methods and Assumptions

Analysis of impacts on mineral material sales 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 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 would change the economic feasibility of developing a site. Additional actions or conditions that might cause direct or indirect impacts on mineral material sales are described under indicators, below.

Indicators

Indicators for impacts on salable minerals and the measurements used to describe the impacts (where available or appropriate) are described below:

- Actions that reduce the availability and opportunity for development of resources
- Amount of federal minerals available versus closed to development Indirect impacts include loss of production of the mineral for public use and for revenues and tax revenues
- Actions placing restrictions or requirements that reduce efficiency and increased operational costs that could make development infeasible
- Acreage unavailable for surface disturbance
- Indirect impacts include reduced production of mineral resources for the public use and for the generation of revenues and tax revenues; possible adverse impact of higher cost of accessing portion of lease via more circuitous route for access road, electric utility lines, seasonal limitations to road use or additional restrictions and requirements on development
- Actions that affect the ability to access minerals
- Acreage unavailable for surface disturbance
- Indirect impacts include adverse impacts of restrictions affecting the ability to access minerals that would otherwise be available; includes limits to road construction, permanent road closures, avoidance, and exclusion areas

Assumptions

Assumptions for this analysis include the following:

- The terms “salable minerals” and “mineral materials” are used interchangeably.
- Any alternative that limits salable mineral development (i.e., reduces the area available for development) will have some adverse impact on the mineral materials.
- The 43 CFR Part 3600 and 36 CFR § 228, Subpart C, regulations manage disposal of mineral materials.
- Mineral operations are sensitive to costs, especially when prices are depressed.
- Ability to construct roads and utilities on private lands to access federal minerals subject to landowner approval are not guaranteed.
- Mineral resources are not evenly distributed across the landscape.
- Operators need predictable continuity of operations before acquiring or developing land.
- Development techniques are highly technical and not uniformly applicable.
- Seasonal closures on travel may make full development infeasible.
- A minimum of 5 years is needed for restoring self-sustaining native grass and forb cover on reclamation.
- A minimum of 10 years is needed for successful establishment or colonization by sagebrush on reclamation.
- Implementing management actions for the following resources or resource uses would have negligible or no impact on salable minerals and are therefore not discussed in detail: recreation, range management, wind energy development, industrial solar, wild horse management, fuels management, fire operations, ESR, and habitat restoration.

Nature and Type of Effects

Management actions for resources and resource uses could affect potential salable mineral development when they result in (1) reduced availability of salable mineral resources, (2) reduced access to new or existing material sites due to restrictions on use of the overlying surface lands, and (3) reduced efficiency and increased operational costs that make potential salable mineral development economically infeasible.

Impacts Common to All Alternatives

Due to the definitions of the alternatives being analyzed, there are no goals common to all alternatives.

4.14.3.1. Alternative A

This alternative does not designate PPMAs or PGMA in the planning area. This alternative will have no effect on salable mineral management.

Impacts from Lands and Realty

Management actions for programs related to infrastructure development other than lands and realty would not impact mineral materials. Therefore, only the impacts from lands and realty management actions are discussed in the paragraphs below.

Under Alternative A, 17,456,300 acres (98 percent) of existing PPH and PGH would continue to be open to ROW location. However, construction of new roads would likely decrease on BLM-administered and Forest Service-administered surface in the decision area that would continue to be managed as ROW/SUA avoidance or exclusion under this alternative, which would result in a decrease in demand for mineral materials in those areas. Impacts from this decrease in demand would be mitigated where new ROWs could be co-located within existing ROWs to satisfy valid existing rights.

4.14.3.2. Alternative B

This alternative designates PPMAs and PGMAs in the planning area. This alternative would close PPMAs to mineral material sales and require restoration of salable mineral pits no longer in use to meet GRSG conservation objectives.

Impacts from Lands and Realty

Management actions for programs related to infrastructure development other than lands and realty would not impact mineral materials. Therefore, only the impacts from lands and realty management actions are discussed in the paragraphs below.

Impacts from Minerals Management

Under Alternative B, federal mineral estate in PPMAs would be closed to mineral material disposal. The types of impacts from these closures would decrease access for local governments and members of the public to mineral material sites.

In PPMAs, mineral material pits no longer in use would be restored to meet GRSG habitat conservation objectives. Requiring reclamation of mineral material pits no longer in use could increase costs on developers if the BLM and Forest Service required the developers to pay for the reclamation.

Management of mineral materials outside of PPMAs would be the same as that under Alternative A.

4.14.3.3. Alternative C

This alternative would have the same effect as Alternative B, but would apply to a larger area of PPMAs.

4.14.3.4. Alternative D

This alternative designates PPMAs and PGMAs in the planning area. This alternative allows for no new commercial mineral material sales in priority and general habitat. In PPMAs, this alternative would require restoration of salable mineral pits no longer in use to meet GRSG conservation objectives. Mineral material sales would be allowed in general habitat as required to meet federal, tribal, state, county, and public needs. Loss of habitat in general habitat would be offset through off site mitigation. Additional mitigation may be required to offset any net

loss of habitat as a result of authorizing expansion of existing materials pits. Habitat loss in PPMAs would be offset through mitigation to ensure no net unmitigated loss. Designation of new community pits would be located outside of priority areas.

Impacts from Lands and Realty

Management actions for programs related to infrastructure development other than lands and realty would not impact mineral materials.

Impacts from Minerals Management

Under Alternative D, federal mineral estate in PPMAs would be closed to mineral material disposal. The types of impacts from these closures would decrease access for local governments and members of the public to mineral material sites.

In PPMAs, mineral material pits no longer in use would be restored to meet GRSG habitat conservation objectives. Requiring reclamation of mineral material pits no longer in use could increase costs on developers if the BLM and Forest Service required the developers to pay for the reclamation.

Management of mineral materials outside of PPMAs would be the same as that under Alternative A.

4.14.3.5. Alternative E

Existing projects would operate under existing rules and regulations. New proposed projects would avoid or minimize conflicts in SGMAs which would be overseen by the Nevada Sagebrush Ecosystem Council. Habitat disturbance would be limited to 5 percent per year per 640 acres, unless habitat treatments show credible positive results, and would refer disturbance levels exceeding 5 percent per 640 acres to evaluation and consultation with the Nevada Sagebrush Ecosystem Technical Team. SGMAs apply only to lands within Nevada.

Impacts from Lands and Realty

Management actions for programs related to infrastructure development other than lands and realty would not impact mineral materials.

Impacts from Minerals Management

Under Alternative E, all federal mineral estate not closed to mineral material disposal under Alternative A would remain open. Additional restrictions would apply within the federal mineral estate within GRSG habitat, including maximum disturbance of no more than five percent of occupied habitat in each population area. Noise, structure height, and timing limitations would also apply. Impacts from these restrictions on mineral material development would be the same type as those described under Alternative D. Mitigation may also be required, which would increase costs of mineral material development.

Federal mineral estate in the decision area outside occupied, suitable, and potential habitat would be subject to the same management as that under Alternative A.

4.14.3.6. Alternative F

This alternative would have the same effect as Alternative B.

4.15. Areas of Critical Environmental Concern

4.15.1. Methods and Assumptions

Indicators

Indicators of impacts on ACECs are as follows:

- Potential degradation on the relevance and importance values of existing ACECs such as plant communities, wildlife, soil resources and other natural processes may be prohibitive to management direction to improve GRSG habitat.
- Potential threat of irreparable harm to some ACEC relevance and importance values such as historical and cultural structures and sites may limit proposed management decisions to improve GRSG habitat.
- Indicators of beneficial impacts on ACECs are proposed GRSG management decisions will defer to management decisions for existing ACECs that provide more restrictive protective measures.
- Any ACECs designated for the protection of GRSG habitat would be managed as Zoological Special Interest Areas on Forest Service-administered lands.

Assumptions

The analysis includes the following assumptions:

- Management decisions to improve GRSG habitat may result in degradation to vegetative relevance and importance values of some existing ACECs.
- Management decisions to improve GRSG habitat by reducing or eliminating surface disturbances and human interaction would be beneficial to ACECs with Cultural or Historic relevance and importance values.
- Designation of an ACEC does not prevent other appropriate resource uses so long as they are not detrimental to relevance and importance values.
- Management decisions to improve GRSG habitat may result in unforeseen opportunities for noxious and invasive plant species to encroach on vegetative relevance and importance values.

4.15.2. Nature and Type of Effects

ACECs cover a variety of different resources, each with different relevance and importance values. With these relevance and importance values there are specific management decisions which protect and preserve those values. In some cases the effects may be direct and in others the effects may be indirectly caused by primary or secondary impacts from GRSG habitat management

activity. It is expected that proposed GRSG management decisions will defer to existing ACEC management decisions that are more restrictive in the protection of ACEC resources.

ACECs with relevance and importance values that are specific to vegetative resources may be directly impacted by management decisions to improve or re-establish GRSG habitat. This may occur through localized changes wrought by large-scale surface disturbance to soils and existing vegetation. Surface disturbances can result in unforeseen opportunities for noxious and invasive plant species to encroach on protected vegetative resources.

ACECs with relevance and importance values that are specific to historical and cultural resources may be both directly and indirectly impacted by GRSG habitat restoration management decisions. This may occur through physical impacts on cultural sites and historic structures.

ACECs with relevance and importance values that are specific to other wildlife resources may be indirectly impacted by management decisions to improve or re-establish GRSG habitat. This may occur through changes in vegetative food sources or protective cover brought about by altering the vegetative landscape from scattered woodland to open sage brush steppe.

ACECs with relevance and importance values that are specific to scenic or geologic resources may be impacted directly by GRSG habitat restoration management decisions. However, these impacts would probably be more short term rather than long term in duration. Vegetative manipulation would result in a highly visible in the short term, but would become less intrusive as time passes.

Overall, the potential effect of impacts from proposed management decisions can only be discussed in very general terms. Since relevance and importance values cover a variety of resources, management decisions for GRSG habitat restoration must be addressed and analyzed in site-specific NEPA documents in order to accurately portray the potential impacts on ACEC relevance and importance values.

Implementing management for the following resources would have no impact on ACECs and are therefore not discussed in detail: CTTM, recreation, lands and realty, range management, fluid minerals, solid minerals, mineral split-estate, fire and fuels management, and habitat restoration and vegetation management.

4.15.3. Impacts Common to All Alternatives

There are no impacts on ACECs that are common to all alternatives.

4.15.4. Alternative A

Impacts from Greater Sage-Grouse Management

Under Alternative A, existing ACEC management decisions will continue to provide protective measures to relevance and importance values in those ACECs.

4.15.5. Alternative B

Impacts from Greater Sage-Grouse Management

Same as Alternative A.

4.15.6. Alternative C

Impacts from Greater Sage-Grouse Management

Under Alternative C, the number of acres under ACEC management would increase exponentially. In certain circumstances, GRSG Management decisions may benefit and compliment management decisions protecting relevance and importance values in existing ACECs. It is also expected that more restrictive management decisions in existing ACECs would not be subordinate to proposed GRSG management decisions.

4.15.7. Alternative D

Impacts from Greater Sage-Grouse Management

Same as Alternative A.

4.15.8. Alternative E

Impacts from Greater Sage-Grouse Management

Same as Alternative A.

4.15.9. Alternative F

Impacts from Greater Sage-Grouse Management

Impacts from ACEC management would be the same as Alternative C; however, 10,776,400 fewer acres would be designated as ACECs than under Alternative C.

4.16. Water Resources

4.16.1. Methods and Assumptions

Indicators

Indicators of impacts on water resources are as follows:

- More areas closed to activities that result in surface disturbance and cause erosion and sedimentation
- More areas treated for fuels and invasive species, reducing wildfire potential and subsequent erosion and sedimentation

Assumptions

The analysis includes the following assumptions:

- Climate change forecasts will generally result in less water availability throughout the planning area.

- Areas closed to ROWs, travel management, mining, or with NSO stipulations will result in less potential for water erosion and sedimentation to streams and springs.
- 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.

4.16.2. Nature and Type of Effects

Management actions could change the quality and accessibility of water features that serve as GRSG drinking sources. Drinking water accessibility and quality in turn affect the health and survival of the GRSG. Actions could also increase or decrease the ability of water sources to serve as mosquito breeding habitat, which could in turn increase or decrease, respectively, the risk of West Nile virus transmission to GRSG.

Surface water quality is influenced by both natural and human factors. Aside from the natural factors of weather-related erosion of soils into waterways, surface water quality can be affected by the transport of eroded soils into streams due to improperly managed livestock grazing, introduction of waste matter such as fecal coliforms into streams from domestic livestock, and “low water” crossing points of roads, routes, and ways used by motorized vehicles.

Surface-disturbing activities can remove or disturb essential soil-stabilizing agents, such as vegetation diversity, soil crusts, litter, and woody debris. These soil features function as living mulch by retaining soil moisture and discouraging annual weed growth (Belnap et al. 2001). Loss of one or more of these agents increases potential erosion and sediment transport to surface water bodies, leading to surface water quality degradation. Surface-disturbing activities under certain circumstances can also lead to soil compaction, which decreases infiltration rates and elevates potential for overland flow. Overland flow can increase erosion and sediment delivery potential to area surface water bodies, leading to surface water quality degradation.

In areas with NSO stipulations, managed as ROW/SUA exclusion, or closed to mining activities, water quality would be protected since ground disturbance would be prohibited and soil erosion limited to natural processes. In areas managed as ROW/SUA avoidance, water quality would receive some protection since ground disturbance would often be limited. ROW/SUA avoidance areas would generally result in lower impacts on water quality, compared with areas not managed as ROW/SUA avoidance.

Surface-disturbing activities within stream channels, floodplains, and riparian habitats are more likely to alter natural morphologic stability and floodplain function. Morphologic destabilization and loss of floodplain function accelerate stream channel and bank erosion, increase sediment supply, dewater near stream alluvium, cause the loss of riparian and fish habitat, and deteriorate water quality (Rosgen 1996). Altering or removing riparian habitats can reduce the hydraulic roughness of the bank and increase flow velocities near the bank (National Research Council 2002). Increased flow velocities near the bank can accelerate erosion, decreasing water quality.

There are approximately 517.2 miles of 303(d) listed streams and 90 acres of 303(d) listed water bodies located within PPMAs and PGMAs in the planning area.

When surface-disturbing impacts are allowed to alter natural drainage patterns, the runoff critical to recharging and sustaining locally important aquifers, springs/seeps/fens, wetlands, and associated riparian habitats is redirected elsewhere. As a result, these sensitive areas can be

dewatered, compromising vegetative health and vigor, while degrading proper function and condition of the watershed.

Subsurface disturbances can alter natural aquifer properties (e.g., enhance hydraulic conductivity of existing fractures, breach confining units, and change hydraulic pressure gradients), which can increase potential for contamination of surface and groundwater resources. Furthermore, altering natural aquifer properties can dewater locally important freshwater sources (e.g., groundwater, springs, seeps, fens, and streams).

Under dry conditions, surface-disturbing activities release dust into the air. During winter, wind-blown dust can settle on top of snow and affect the rate of snowmelt. Dust-covered snow versus clean snow can have albedo (reflectivity) values as low as 0.35, doubling the amount of absorbed solar radiation. Research and simulations based on observations in the Senator Beck Basin Study Area near Silverton, Colorado, indicate that excess dust on snow (versus pre-1800 conditions) increased the rate of snowmelt and advanced the timing of melting by about three to four weeks (Painter et al. 2007). Furthermore, results of studies conducted by Painter and others (2007) indicate that annual runoff is reduced by five percent under current dust conditions. Primary contributing factors for decreased runoff follow.

Greater absorption of energy during snowmelt causes more of the snow to sublimate directly into the atmosphere.

Earlier melting exposes the ground surface to sunlight and warmth, which both allow more water to evaporate directly from the soil and extend the growing season for plants that then can transpire additional water. It is this combined increase in evapotranspiration that appears to have the most impact on stream flow.

Surface water runoff depends on both natural factors and land management. Natural factors include climate, geology and soils, slope, channel conditions, and vegetation type and density. Land use or management actions that alter these natural factors play a role in altering surface water runoff. Such actions include grading or compacting soils for new roads or well pads and calling for management prescriptions that alter the type or density of vegetation.

Reducing water flow can have adverse impacts on the ecology of a watershed, its recreational potential, the availability of drinking water and water for other uses, and groundwater quality and quantity. Water quality impacts from reduced water supplies include increased water temperatures, pH levels, and alkaline levels. Reductions in water supply could result from consumptive uses of surface water or tributary groundwater sources that do not return water to the basin. Examples are evaporative loss from new surface water features, evapotranspiration from irrigation of vegetation, injection into deep wells, or use in drilling fluids that are later disposed of outside of the basin.

Water right holdings and use also have the ability to impact water quantity on public lands. Both the States of Nevada and California are 'prior appropriation' states, meaning that the first water right holder to put a water to beneficial use, i.e., with the earliest priority date, has the first right to the water. Any water right holders on waters either located on public land or upstream of public land, could potentially utilize all available water, making less water available for wildlife use and riparian habitat maintenance unless a prior federal right has been exercised, or an appropriated right has been issued to the BLM by the State.

Water use on public lands primarily depends on the water rights associated with the source. Privately held water rights on public land can result in full appropriation of surface waters and

modification of riparian habitats. An appropriation of groundwater rights has the potential to reduce surface water flows. Although land management agencies may not have the ability to fully control all water uses on public land, the agencies should be actively involved in the States water rights processes, working with water right holders to ensure the use will not impact GRSG and acquiring water rights to protect habitat and ensure water sources for GRSG.

Riparian areas are very productive and valuable parts of the ecosystem. They often act as transition zones between the aquatic and upland areas increasing benefits such as fish and wildlife habitat, erosion control, forage, late season stream flow, and water quality. Wetlands and meadows provide benefits by acting as reservoirs within the watershed regulating late season stream flow and increasing groundwater recharge. Since these areas generally have saturated soils, they are more vulnerable to soil compaction and rutting, making revegetation a difficult task. The riparian area is the section of land and water forming a transition from aquatic to terrestrial ecosystems along streams and lakes. It supports high soil moisture and a diverse assemblage of vegetation and performs important ecological functions. It acts as a filtering system, stabilizes banks, and regulates stream water quality. The vegetation provides a buffer for the stream by slowing down water and settling out sediment and nutrients. Strong root masses decrease surface erosion by stabilizing the streambanks and are able to absorb floodwater without degrading during high stream flows. The vegetative cover associated with riparian areas provide a thermal break from radiant sunlight reaching the water surface increasing water temperatures and reducing oxygen levels.

Lands that are open for fluid minerals leasing have the potential for future health and safety risks related to oil, gas, and geothermal exploration, development, operation, and decommissioning. The number of acres open for leasing is proportional to the potential for long-term direct health and safety impacts. Use, storage, and transportation of fluids, such as produced water, hydraulic fracturing fluids, and condensate, have the possibility of spills that could migrate to surface or groundwater, causing human health impacts. Additionally, some of the techniques used in mining activities, such as directional drilling and hydraulic fracturing, could result in contamination of overlying aquifers and drinking water supplies (Osborn et al. 2011; Duke University 2012).

Potential impacts from locatable mineral, mineral material, and non-energy leasable mineral activities and development include the release of pollutants capable of contaminating surface water during stormwater runoff or contaminating aquifers during groundwater recharge. Mineral activities and developments could also alter drainage patterns, which would affect stream hydrographs and water supplies. Discharge of mine water can alter water chemistry and impair natural stream morphologic conditions.

Grazing by livestock and wild horses and burros can increase sediment and other nutrients (primarily nitrogen and phosphorus) to streams through bank trampling and excrement. As stream banks break down, parts of the bank slough off and into the stream channel. This increase in sediment load can affect fish habitat and alter channel stability. Excrement, when added directly to a stream or within the riparian area, can increase the amounts of nutrients in streams. Urine has been found to have prolonged effects on nitrogen fixation in soil (Menneer et al. 2003). High amounts of nutrients can lead to increased aquatic plant and algal growth, which can decrease the dissolved oxygen content and affect fish.

The BLM manages to ensure water quality complies with State Standards as mandated by the Standards and Guidelines for Livestock Grazing Administration (43 CFR 4180.2 (b)). The Forest Service manages livestock grazing to ensure compliance with appropriate water quality

standards under the direction contained in 36 CFR Part 222, Forest Service Manual 2200, and Forest Service Handbook 2209. For wild horses and burros, the BLM and Forest Service manage within existing herd management areas for healthy populations and to achieve a thriving natural ecological balance with respect to wildlife, livestock and other multiple uses.

Vegetation management activities generally benefit water resources by restoring rangelands to native communities and reducing the potential for wildfire and sedimentation and erosion. Pinyon-juniper woodlands have increased thorough out the planning area since the early 1900s due to increased livestock grazing and fire suppression. Early investigators thought that reduction in pinyon-juniper communities could result in higher water yields. Although conversion of pinyon-juniper woodlands to more herbaceous and shrub communities does not result in an increase to water yields (Follett and Stropki 2008), it can reduce wildfire risk.

Invasive vegetation species can impact water resources by altering wildfire regimes and increasing sedimentation and erosion risk, thereby impacting water quality.

These species are able to take advantage of soil disturbances and establish themselves and out-compete native species for resources. With few natural predators, invasive species are able to take advantage of favorable ecological conditions and spread at excessive rates. Most invasive weeds do not have strong root structures that are needed to hold soil in place. In many instances, accelerated erosion is seen in areas dominated by invasive species. Cheatgrass is one of the most common and prolific invasive weeds found within the planning area. Although cheatgrass is able to provide adequate cover to protect soils from erosion after invasion, this protection decreases during drought conditions and instances of die-off and results in an increased risk of wildfire (Pellant 1996).

Effects of fire on water resources are determined largely by the severity of the fire, suppression tactics used for fire management and post-fire precipitation regimes (Neary et al. 2005). Higher-severity fires, typically associated with wildfire, often result in near complete consumption of vegetation and litter cover and can cause changes to soil chemistry resulting in hydrophobic soil conditions. As a result, stream flow responses in severely burned watersheds are typically higher, in some cases orders of magnitude, than in unburned or lower severity burned watersheds. Additionally, increased flooding and debris flow risks can occur up to 5 years after a severe wildfire. Prescribed fire can be beneficial to water resources by reducing the risk of high severity wildfires in treated watersheds. Additionally, the purpose of a prescribed fire is rarely to consume all vegetation or cause high severity conditions. Streamflow responses after prescribed fires are often lower in magnitude as compared with wildfires and typically do not result in the drastic stream flow alterations (flooding and debris flows) as after wildfires (Neary et al. 2005).

Fire suppression activities, such as building fire lines, drafting of water sources, applying fire retardants and foams, and driving cross-country can have direct impacts on water resources. Building fire lines and driving cross-country creates new roads and trails that can channelize flows and increase sedimentation and erosion to streams and springs. Chemical fire retardants most commonly used in current suppression activities are ammonium-based. Ecologically, these fire retardants produce effects similar to application of fertilizers (Little and Calfee 2003). This can result in changes to water quality and can result in increased algal biomass in water bodies. Additionally, some retardants can contain low quantities of chemicals that can be toxic to aquatic biota. The BLM and Forest Service have identified buffers along water systems to reduce the potential for retardant entering water bodies (Forest Service 2011d; DOI and USDA 2013).

Drafting of water sources can reduce overall water available in streams and springs where drafting occurs. This can impact water rights and reduce water available to for habitat maintenance.

Changes in vegetation communities due to wildfire can also affect water resources. Most wildfires in the planning area result in an increase to invasive vegetation communities, particularly cheatgrass. Cheatgrass communities often have shorter wildfire return intervals, altering the 32-70 return interval for sagebrush communities to a 5-year wildfire return interval (Pellant 1996).

Roads and trails can impact water quality. Stream crossings, formed when roads and trails traverse streams, remove vegetation and create vectors for surface runoff and sediment movement directly into streams. When the vegetation is removed, the banks become more susceptible to erosion and can slough off into the channel. During times of high stream flows the bare banks are easily eroded, leading to channel downcutting and degradation. The roads and trails act as new channels, crisscrossing the landscape and concentrating water. When these tracks cross a stream, it is an open outlet for the water and sediment to enter. In some instances a road or trail can intercept the stream and divert the water onto it.

Recreational activities, both motorized and non-motorized, often result in ground disturbance. These impacts are typically dispersed and small in size but can cause localized impacts on water resources by increasing erosion and sedimentation to streams and springs.

Activities beneficial to water resources are primarily defined as improving conditions by enhancing or restoring degraded water quality or by reducing ongoing groundwater depletion. Changing grazing patterns in riparian areas further benefits the water quality and geomorphic function of streams. Management actions regarding closure or avoidance of specific areas, or restrictions of disturbance, protect environmental conditions and, thus, are beneficial. Mitigation measures also reduce the impacts on water resources from ongoing or future activities.

Implementing management for the following resources would have negligible or no impact on water resources and are therefore not discussed in detail: mineral split-estate and ACECs.

4.16.3. Impacts Common to All Alternatives

This section will describe the impacts common to all alternatives, if applicable. The description of the impacts is the same throughout the alternatives; however, the degree of the impact would vary within each alternative.

Impacts from Leasable, Salable, and Locatable Minerals Management

Mineral development is generally associated with the risk of impairments to local surface waters and groundwater. Mineral development disturbs soils and can result in increased erosion and contamination of waterways via runoff. Mineral development increases the presence of petroleum-using vehicles and equipment on the land and increases the likelihood of chemical spills that can sink into the earth and contaminate groundwater. Mineral development can result in pools of standing water that can serve as mosquito breeding habitat, increasing the ability for West Nile virus to spread into a landscape otherwise not at risk to the pathogen.

Impacts from Lands and Realty and Renewable Energy Management

Lands and realty and renewable energy decisions affect where ground disturbing activities can and cannot occur. The use of ROW/SUA exclusion and ROW/SUA avoidance designations limit

the amount of man-made runoff of soils and chemicals into waterways within those areas and are generally considered to be protective of water quality. ROW/SUA exclusion and avoidance are also seen to reduce the likelihood of chemical spills onto the ground, which can then sink into the earth and contaminate groundwater.

Impacts from Livestock Grazing and Wild Horses and Burro Management

Livestock and wild horses and burros generally cause decreases in water quality through the heavy trampling of soils and vegetation along and within natural water features that are also used by GRSG as drinking water sources. At the same time, water supply structures throughout the landscape that have been established for the benefit of livestock and wild horses and burros also often provide drinking water sources for GRSG.

Impacts from Vegetation Management

Vegetation management activities can result in short-term impacts on water quality due to increased erosion and sedimentation to water bodies. Long-term impacts are typically beneficial by reducing non-native communities and the risk to wildfire.

Impacts from Fire and Fuels Management

Effects of fire on water resources are determined largely by the severity of the fire, suppression tactics used for fire management and post-fire precipitation regimes. Hazardous fuels treatments will result in an overall decrease in wildfire potential, thereby decreasing impacts on water resources.

Impacts from Travel and Transportation

Roads and trails generally result in impacts on water quality by removing vegetation and creating vectors for surface runoff and sediment movement directly into streams. Roads and trails act as new channels, crisscrossing the landscape and concentrating water. When these tracks cross a stream, it is an open outlet for the water and sediment to enter. Areas closed or limited to travel and transportation would have lesser impacts on water resources.

Impacts from Recreation Management

In general, recreational activities can result in impacts on water quality. Both motorized and non-motorized activities can result in ground disturbance thereby increasing erosion and sedimentation to local water bodies.

Impacts from Riparian Areas and Wetland Management

Riparian habitats are very productive and valuable parts of the ecosystem. They often act as transition zones between the aquatic and upland areas increasing benefits such as fish and wildlife habitat, erosion control, forage, late season stream flow, and water quality. It acts as a filtering system, stabilizes banks, and regulates stream water quality. The vegetation provides a buffer for the stream by slowing down water and settling out sediment and nutrients and acts as a thermal break from radiant sunlight reaching the water surface increasing water temperatures and reducing oxygen levels. Any actions that would restore or enhance riparian habitats would be beneficial to water resources.

4.16.4. Alternative A

Impacts from Greater Sage-Grouse Management

Under Alternative A, there are currently no lands designated by the BLM as GRSG existing habitat within the Sub-regional planning area. The LUPs do not contain special designations pertaining to managing GRSG, such as GRSG “Core Areas” or “Priority Habitat” or other types of references to relative habitat quality. There are no lands identified for PPH or PGH under Alternative A for GRSG management.

Impacts from Lands and Realty

Under Alternative A, 114,200 acres would be managed as ROW/SUA avoidance, 276,600,400 acres as exclusion areas, and 331,200 acres open for disposal.

Impacts from Renewable Energy Management

Under Alternative A, would be managed 276,600 acres as ROW/SUA exclusion and 114,200 acres as avoidance areas for wind energy. No ROW/SUA exclusion or avoidance areas have been identified for solar energy. Impacts from renewable energy management are similar to impacts from lands and realty management. Additionally, ROWs and SUAs associated with renewable energy management are typically large in size (several thousand acres) and in many cases require completely grading a site, particularly for solar projects. This amount of land disturbance can amplify impacts at the project level.

Impacts from Livestock Grazing Management

No acres as closed to livestock grazing and 49,155,100 acres as open to livestock grazing under Alternative A. The BLM would continue to manage to ensure water quality complies with State Standards as mandated by the Standards and Guidelines for Livestock Grazing Administration (43 CFR 4180.2 (b)). The Forest Service manages livestock grazing under the direction in 36 CFR Part 222, Forest Service Manual 2200, and Forest Service Handbook 2209.

Impacts from Wild Horse and Burro Management

Management under Alternative A identifies 7,370,000 acres as HAs, 6,086,200 acres as HMAs, and 344,600 acres as wild horse territory areas. These areas would continue to be managed to meet AMLs and to achieve a natural ecological balance with respect to other uses.

Impacts from Leasable Minerals Management

Under Alternative A, 1,670,800 acres would be managed as closed to fluid minerals, oil and gas and geothermal and identifies -acres as open to fluid minerals, oil and gas and geothermal within PPH and PGH.

Impacts from Locatable Minerals Management

Management under Alternative A identifies 1,670,800 acres petitioned for withdrawal from mineral entry and 16,061,900 acres as open to locatable mineral exploration or development within PPH and PGH. All locatable mineral activities will continue to be managed under the regulations at 43 CFR 3800 through the approval of a Notice of Intent or a Plan of Operations.

Impacts from Salable Minerals Management

Under Alternative A, 1,670,800 acres would be managed as closed to mineral material disposal and 16,061,900 acres would be managed as open for consideration for mineral material disposal on a case-by-case basis within PPH and PGH.

Impacts from Vegetation and Soils

Management under Alternative A does not identify any specific numbers of acres for vegetation treatment other than goals and objectives for managing of vegetation communities outlined in existing LUPs.

Impacts from Fire and Fuels

Management under Alternative A does not specify any acres for hazardous fuels management. All existing LUPs do address fire suppression and hazardous fuels management.

Impacts from Comprehensive Travel and Transportation

Under Alternative A, 874,400 acres would be managed as closed to motorized vehicles, 4,113,300 acres would be managed as limited to existing routes for motorized vehicles, and 12,745,000 acres would be managed as open to all modes of cross country travel within PPH and PGH.

Impacts from Recreation Management

Management under Alternative A does not specify any areas as open or closed to recreation. All BLM and Forest Service districts manage for developed and dispersed recreation and some LUPs may identify areas where specific types of management are designated.

Impacts from Riparian Areas and Wetland Management

All LUPs within the sub-region recognize importance of riparian areas and wetlands and include guidance for protection or enhancement of this resource. Priority riparian habitats are targeted for improvement while impacts on riparian areas as a result of management actions or authorizations are considered through the NEPA process. Many livestock grazing systems developed through the permit renewal process and through assessments of rangeland health are focused on improving riparian habitat conditions. In some cases, mitigation programs developed for land uses such as mining have resulted in restoration of thousands of acres of riparian areas and wetlands in PPMAs and PGMAs.

Condition and trend data for riparian and wetland habitats within the planning area suggest existing programs which directly or indirectly provide for riparian area management are only partially effective (refer to **Section 3.4**, Riparian Areas and Wetlands). Generally, restoration efforts have been focused on priority streams habitats, especially those supporting fisheries. Although highly important to GRSG, lentic riparian areas have received less focus likely because they are small in size, widespread and more difficult to manage. Under this alternative, condition and trend of riparian areas and wetlands in PPMAs or PGMAs is likely to improve but progress may not be consistent across the planning area.

4.16.5. Alternative B

Alternative B generally reduces land disturbances and would result in fewer impacts on water resources associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Management under Alternative B would identify 12,693,500 acres for PPMAs and 5,039,400 acres for PGMA. Protecting GRSG habitat would result in few land disturbances and could result in reduced impacts on water quality. Protection measures may also include protecting existing water sources from future use and result in increases to water availability. Alternative B could result in fewer impacts on water resources than Alternative A.

Impacts from Land Uses and Realty Management

Under Alternative B, 4,932,400 acres would be managed as ROW/SUA avoidance, 12,693,500 acres as exclusion areas, and 233,900 acres no longer suitable for disposal. Management under Alternative B could result in fewer impacts on water resources than Alternative A.

Impacts from Renewable Energy Management

Same as Alternative A.

Impacts from Livestock Grazing Management

Same as Alternative A.

Impacts from Wild Horse and Burro Management

Under Alternative B, 7,370,000 acres would be managed as herd areas, 6,086,200 acres as herd management areas, and 344,600 acres as wild horse territory areas. In addition, it would amend HMA and WHBT plans to incorporate GRSG habitat objectives and management considerations. This could result in fewer impacts on water resources than Alternative A. These areas would continue to be managed to meet AMLs and to achieve a natural ecological balance with respect to other uses.

Impacts from Leasable Minerals Management

Under Alternative B, 12,693,900 acres within PPMA and 374,700 acres within PGMA would be managed as closed and 4,664,700 acres would be managed as open to fluid minerals, oil and gas, and geothermal. This alternative identifies actions and conservation measures for areas that are already leased. Management under Alternative B would result in fewer impacts on water resources than Alternative A.

Impacts from Locatable Minerals Management

Alternative B would identify 12,693,900 acres within PPMA and 374,700 acres within PGMA petitioned for withdrawal from mineral entry and 4,664,700 acres as open to locatable mineral exploration or development. All locatable mineral activities would continue to be managed under the regulations at 43 CFR 3800 through the approval of a Notice of Intent or a Plan of Operations. Alternative B could result in fewer impacts on water resources than Alternative A.

Impacts from Salable Minerals Management

Under Alternative B, 12,693,900 acres within PPMA and 374,700 acres within PGMA would be managed as closed to mineral material disposal and 4,664,700 acres would be managed as open for consideration for mineral material disposal on a case-by-case basis. Alternative B could result in fewer impacts on water resources than Alternative A.

Impacts from Vegetation and Soils Management

Same as Alternative A.

Impacts from Fire and Fuels Management

Management under Alternative B would not specify any specific numbers of acres for hazardous fuels management nor does it specify suppression activities. It does identify RDFs for fire suppression activities, general actions for pre- and post-fire treatment activities, timing of treatments, resting, and use of native plants for revegetation. Based on these actions, Alternative B could have fewer impacts on water resources than Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Under Alternative B, 874,400 acres would be managed as closed to motorized vehicles, 18,900,100 acres as limited to existing routes for motorized vehicles, and 28,179,100 acres as open to all modes of cross country travel. Management under Alternative B would result in fewer impacts on water resources than Alternative A.

Impacts from Recreation Management

Management under Alternative B would not close any areas to recreation activities; it does specify that any BLM SRPs or Forest Service recreation permits must have a neutral or beneficial effect on priority habitat. Neutral or beneficial impacts on GRSG habitat could result in fewer impacts on water resources. Therefore, Alternative B could result in fewer impacts on water resources than Alternative A.

Impacts from Riparian Areas and Wetland Management

Management under Alternative B would identify specific actions to improve and restore riparian habitats through management. These actions would include managing for proper functioning condition, reducing hot season grazing, utilizing herding and other techniques to distribute livestock, authorization of new water developments and modifications of existing developments out of riparian areas. Many of these actions are tools currently utilized by the agencies in the permit process to alleviate impacts due to grazing. However, many of the LUPs do not have these types of tools listed as requirements. Alternative B could result in fewer impacts on water resources than Alternative A.

4.16.6. Alternative C

Management under Alternative C would reduce land disturbances and would result in fewer impacts on water resources associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Same as Alternative B.

Impacts from Land Uses and Realty Management

Under Alternative C, 114,200 acres would be managed as ROW/SUA avoidance, 17,772,900 acres as exclusion areas, and 331,200 acres no longer suitable for disposal. Management under Alternative C would result in fewer impacts on water resources than Alternative A.

Impacts from Renewable Energy Management

Under Alternative C, 620,400 acres would be managed as ROW/SUA exclusion areas and 114,200 acres would be managed as avoidance areas for wind energy. Approximately 17,732,900 acres are identified for exclusion for solar energy. Impacts from renewable energy management are similar to impacts from lands and realty management. Additionally, ROWs associated with renewable energy management are typically large in size (several thousand acres) and in many cases require completely grading a site, particularly for solar projects. This amount of land disturbance can amplify impacts at the project level. Management under Alternative C would result in fewer impacts on water resources than Alternative A.

Impacts from Livestock Grazing Management

Management under Alternative C would identify 17,732,900 acres as closed to livestock grazing within PPMA. This alternative would eliminate grazing from occupied habitat. The BLM would continue to manage to ensure water quality complies with State Standards as mandated by the Standards and Guidelines for Livestock Grazing Administration (43 CFR 4180.2 (b)). The Forest Service manages livestock grazing under the direction in 36 CFR Part 222, Forest Service Manual 2200, and Forest Service Handbook 2209. Additionally, any water developments associated with livestock use would be removed, allowing water in springs and streams to stay within the natural systems. Alternative B should result in fewer impacts on water resources than Alternative A.

Impacts from Wild Horse and Burro Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Management under Alternative C would result in fewer impacts on water resources than Alternative A, because of the restrictions on leasable minerals under Alternative C.

Impacts from Locatable Minerals Management

Management under Alternative C would result in fewer impacts on water resources than Alternative A because management would allow withdrawal of locatable minerals.

Impacts from Salable Minerals Management

Management under Alternative C would result in fewer impacts on water resources than Alternative A because the planning area would be closed to salable minerals.

Impacts from Vegetation and Soils Management

Under Alternative C, removal of water developments associated with livestock management would allow water in springs and streams to stay within the natural systems. This would allow for riparian habitats and associated vegetation to restore back to more natural conditions. Alternative B should result in fewer impacts on water resources than Alternative A.

Impacts from Fire and Fuels Management

Same as Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Same as Alternative A.

Impacts from Recreation Management

Same as Alternative A.

Impacts from Riparian Areas and Wetland Management

Management under Alternative C would eliminate grazing from occupied GRSG habitat. Livestock use is one of the most damaging management activities to riparian habitats and water resources. By eliminating livestock grazing, impaired riparian habitats would be able to recover, allowing them to become functioning systems. This alternative also identifies actions including the removal of watering systems associated with livestock, allowing for further enhancement of riparian habitats and giving riparian systems the ability to recover more quickly. Management under Alternative C would result in fewer impacts on water resources than Alternative A.

4.16.7. Alternative D

Management under Alternative D would reduce land disturbances and would result in fewer impacts on water resources associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Same as Alternative B.

Impacts from Land Uses and Realty Management

Under Alternative D, 17,456,300 acres would be managed as ROW/SUA avoidance, 276,600 acres as exclusion areas, and 336,200 acres no longer suitable for disposal. Management under Alternative D would result in fewer impacts on water resources than Alternative A.

Impacts from Renewable Energy Management

Under Alternative D, 17,732,900 acres would be managed as ROW/SUA exclusion and 114,200 acres as avoidance areas for wind energy. Under Alternative D, 17,732,900 acres would be identified for exclusion for solar energy. Impacts from renewable energy management are similar to impacts from lands and realty management. Additionally, ROWs and SUAs associated with renewable energy management are typically large in size (several thousand acres) and in many cases require completely grading a site, particularly for solar projects. This amount of land disturbance can amplify impacts at the project level. Alternative D could result in fewer impacts on water resources than Alternative A.

Impacts from Livestock Grazing Management

Same as Alternative A.

Impacts from Wild Horse and Burro Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Under Alternative D within PPMA and PGMA, 1,670,800 acres would be managed as closed to fluid minerals, oil and gas and geothermal and identifies 16,061,900 acres as open to fluid minerals, oil and gas and geothermal. In addition, Management under Alternative D would list stipulations for NSO in priority GRSG habitat for currently unleased areas and require site-specific conservation measures for reducing land disturbance on leased areas. Alternative D should result in fewer impacts on water resources than Alternative A.

Impacts from Locatable Minerals Management

Same as Alternative A.

Impacts from Salable Minerals Management

Under Alternative D, 17,732,000 acres would be managed as closed to mineral material disposal and 0 acres as open for consideration for mineral material disposal on a case-by-case basis. Alternative D could result in fewer impacts on water resources than Alternative A.

Impacts from Vegetation and Soils Management

Management under Alternative D would not identify any specific numbers of acres for vegetation treatment; however, it does have several actions specifying types of treatments and timing. Based on the actions associated with Alternative D, there should be fewer impacts on water resources overall than under Alternative A.

Impacts from Fire and Fuels Management

Management under Alternative D would not specify any acres for hazardous fuels management. It does identify general actions for suppression activities, pre- and post-fire treatment activities, timing of treatments, resting, and use of native plants for revegetation. Based on these actions, Alternative D could have fewer impacts on water resources than Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Management under Alternative D would identify 874,400 acres as closed to motorized vehicles, 16,858,200 acres as limited to existing routes for motorized vehicles, and 0 acres as open to all modes of cross country travel. Alternative D could result in fewer impacts on water resources than Alternative A.

Impacts from Recreation Management

While management under Alternative D would not close any areas to recreation activities, it would specify that any SRPs or Forest Service SUAs must have a neutral or beneficial effect on priority habitat. It also would also specify that no new recreational facilities would occur in PPMAs and PGMA. Neutral or beneficial impacts and no new recreational facilities in GRSG habitat could result in fewer impacts on water resources. Therefore, management under Alternative D could result in fewer impacts on water resources than Alternative A.

Impacts from Riparian Areas and Wetland Management

Management under Alternative D would identify specific actions to improve and restore riparian habitats through management. These actions include restoration activities, vegetation treatments for native species, managing for proper functioning condition, reducing hot season grazing, utilizing herding and other techniques to distribute livestock, authorization of new water developments and modifications of existing developments out of riparian areas. Many of these actions are tools currently utilized by the agencies in the permit process to alleviate impacts due to grazing. However, many of the LUPs do not have these types of tools listed as requirements. Management under Alternative D would result in fewer impacts on water resources than Alternative A.

4.16.8. Alternative E

Alternative E does not outline specific management actions and would result in similar impacts on water resources as Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Management under Alternative E would identify GRSG management areas and discuss collaboration through the ecosystem council, monitoring of habitat, predation controls, a mitigation banking program, mitigation of habitat, and limits disturbances greater than or equal to 5 percent of 640 acres. Mitigation of habitat, specifically restoration or creation of habitat could reduce impacts on water resources, but the result would be dependent on the actions occurring and location of the work. Alternative E could result in fewer impacts on water resources than Alternative A.

Impacts from Land Uses and Realty Management

Management under Alternative E would not identify areas for ROW/SUA exclusion, ROW/SUA avoidance or areas available for disposal, rather it discusses following a strategy to avoid conflicts between habitat and ROWs and requires projects to avoid, minimize, and mitigate in occupied and suitable habitat on disturbances greater than or equal to 5 percent of 640 acres. Alternative E could result in fewer impacts on water resources than Alternative A.

Impacts from Renewable Energy Management

Management under Alternative E would not identify areas for ROW/SUA exclusion or ROW/SUA avoidance for renewable energy management, rather it discusses following a strategy to avoid conflicts between habitat and ROWs. Impacts would be the same as Alternative A.

Impacts from Livestock Grazing Management

Management under Alternative E would not identify areas open or closed to livestock grazing. It does identify strategies for improving GRSG habitat through prescribed grazing actions and ensuring grazing activities maintain or enhance SGMAs. Additionally, it requires meeting existing BLM and Forest Service policies such as meeting RAC Standards and Guidelines for Ecological Health as well as meeting proper functioning conditions in riparian areas Alternative E could result in fewer impacts on water resources than Alternative A.

Impacts from Wild Horse and Burro Management

Management under Alternative E would not identify herd areas, herd management areas or wild horse territories. It does require management of wild horses and burros at AMLs. Existing BLM and Forest Service policies, as well as associated LUPS, already require management of wild horses and burros at AML. Impacts would be the same as Alternative A.

Impacts from Leasable Minerals Management

Management under Alternative E would not identify areas as closed or open to fluid minerals. It does require projects to avoid, minimize, and mitigate in occupied and suitable habitat where disturbances are greater than or equal to 5 percent of 640 acres. Alternative E could result in fewer impacts on water resources than Alternative A.

Impacts from Locatable Minerals Management

Management under Alternative E would not identify areas for petition for withdrawal from mineral entry or open to locatable mineral exploration or development. It does require projects to avoid, minimize, and mitigate in occupied and suitable habitat where features are greater than 32 acres. Alternative E could result in fewer impacts on water resources than Alternative A. Impacts would be the same as Alternative A.

Impacts from Salable Minerals Management

Management under Alternative E would not identify areas as closed to mineral material disposal or open for consideration for mineral material disposal. It does require projects to avoid, minimize, and mitigate in occupied and suitable habitat on disturbances greater than or equal to 5 percent of 640 acres. Alternative E could result in fewer impacts on water resources than Alternative A. Impacts would be the same as Alternative A.

Impacts from Vegetation and Soils Management

Management under Alternative E would not identify any specific numbers of acres for vegetation treatment. It does identify general actions that could be taken to improve habitat and vegetation communities including pinyon-juniper removal, plantings and seedings, and invasive weed treatments. Alternative E could result in fewer impacts on water resources than Alternative A.

Impacts from Fire and Fuels Management

Management under Alternative E would not specify any specific numbers of acres for hazardous fuels management or post-fire rehabilitation treatments. It does identify general actions for suppression activities, particularly associated with improving initial attack suppression actions. Based on these actions, Alternative E could have fewer impacts on water resources than Alternative A.

Impacts from Comprehensive Travel and Transportation Management

Management under Alternative E would not identify areas as closed to motorized vehicles, or as limited to existing routes for motorized vehicles or as open to all modes of cross country travel. It would require collaboration between local, state, and federal agencies to designate OHV areas outside of GRSG management areas and would seek to avoid, minimize, or mitigate new activities. Alternative E could result in fewer impacts on water resources than Alternative A.

Impacts from Recreation Management

Management under Alternative E would not identify areas as closed to recreational use or specify any conservation measurements associated with recreation. Impacts would be the same as Alternative A.

Impacts from Riparian Areas and Wetland Management

Management under Alternative E would maintain or achieving proper functioning condition and meeting the standards and guidelines for ecological health. Both of the actions are required under the Standards and Guidelines for Livestock Grazing Administration (43 CFR 4180.2 (b)). It does identify strategies for improving GRSG habitat through prescribed grazing actions, ensuring grazing activities maintain or enhance SGMAs and improving vegetation communities, which could occur in riparian habitats. Alternative E could result in fewer impacts on water resources than Alternative A.

4.16.9. Alternative F

Alternative F generally reduces land disturbances and would result in fewer impacts on water resources associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Same as Alternative B.

Impacts from Land Uses and Realty Management

Under this alternative, there would be a 3 percent cap on disturbance within GRSG habitat. Once the cap is met, no new activities that would result in land disturbance would be authorized. This would have an overall benefit on water resources, specifically water quality. Management under Alternative F could result in fewer impacts on water resources than Alternative A.

Impacts from Renewable Energy Management

Under Alternative F, 17,732,900 acres would be managed as ROW/SUA exclusion and 114,200 acres as avoidance areas for wind energy. No ROW/SUA exclusion or avoidance areas have been identified for solar energy. Impacts from renewable energy management are similar to impacts from lands and realty management. Additionally, ROWs and SUAs associated with renewable energy management are typically large in size (several thousand acres) and in many cases require completely grading a site, particularly for solar projects. This amount of land disturbance can amplify impacts at the project level. The 3 percent cap on disturbance would also reduce activities within GRSG habitat. Management under Alternative F could result in fewer impacts on water resources than Alternative A.

Impacts from Livestock Grazing Management

Alternative F would rest 25 percent of PPMAs/PGMAs each year and limit vegetation utilization levels to 25 percent per year. These actions combined would reduce use in PPMAs/PGMAs. Range improvement construction would increase due to the need to fence out PPMAs/PGMAs areas from grazing use being permitted on adjacent areas. These actions would result in less grazing activities with PPMAs/PGMAs, thereby reducing impacts on water resources.

Management under Alternative F could result in fewer impacts on water resources than Alternative A.

Impacts from Wild Horse and Burro Management

Impacts are similar to Alternative A, except that wild horse AMLs would be reduced by 25 percent within occupied GRSG habitats. While impacts from wild horses and burros would remain, this would reduce the effects of wild horses described under Alternative A.

Impacts from Leasable Minerals Management

Fewer mining activities permitted on the landscape under Alternative F would lessen impacts on water quality and could result in fewer impacts on water resources than Alternative A.

Impacts from Locatable Minerals Management

Under this alternative, there would be a 25 percent reduction in AML in GRSG habitat. Fewer mining activities permitted on the landscape would lessen impacts on water quality. Alternative F could result in fewer impacts on water resources than Alternative A.

Impacts from Salable Minerals Management

Fewer mining activities permitted under Alternative F would lessen impacts on water quality and could result in fewer impacts on water resources than Alternative A.

Impacts from Vegetation and Soils Management

Same as Alternative A.

Impacts from Fire and Fuels Management

Same as Alternative B.

Impacts from Comprehensive Travel and Transportation Management

Fewer travel and transportation activities permitted under Alternative F would lessen impacts on water quality and could result in fewer impacts on water resources than Alternative A.

Impacts from Recreation Management

Management under Alternative F would not close any areas to recreational activities; it would specify that any SRPs or Forest Service SUAs must have a neutral or beneficial effect on priority habitat. It would also specify that timing of certain recreational activities and prohibits cross-country travel in priority GRSG habitat. Neutral or beneficial impacts and no cross-country travel in GRSG habitat could result in fewer impacts on water resources. Therefore, Alternative F could result in fewer impacts on water resources than Alternative A.

Impacts from Riparian and Wetland Management

Management under Alternative F would not identify new water developments in occupied habitat unless it can be shown to benefit GRSG. It would also modify existing developments to maintain the continuity of the predevelopment riparian area within GRSG habitats, make modifications where necessary, including dismantling water developments. Management under Alternative F could result in fewer impacts on water resources than Alternative A.

4.17. Tribal Interests (including Native American Religious Concerns)

4.17.1. Methods and Assumptions

Indicators

Indicators of impacts on GRSG are as follows:

- Tribal interests in the development of management goals and objectives for GRSG management primarily focus on conservation of the species, and therefore are not considered an impact per se. Nevertheless, several Nevada tribes hold federal grazing permits that result in economic benefits. Those tribes also recognize that livestock grazing may lead to decreases in GRSG populations. Tribes that hold grazing permits attempt to balance the needs of maintaining traditional values with the economic benefits realized through livestock grazing.

Assumptions

The analysis includes the following assumptions:

- Tribal interests in the development of goals and objectives for GRSG management primarily focus on conservation of the species. GRSG are important to tribal communities in maintaining traditional culture and values. Therefore, activities that harm GRSG populations would decrease tribal opportunities to maintain traditional practices and values such as observing lekking behavior. In addition, tribes rely on access to traditional pine nutting areas and juniper trees to maintain their cultural practices and values. Travel restrictions placed on roads could decrease tribal opportunities to access critical pine nutting areas. Thinning projects or the removal of pinyon and juniper trees to enhance GRSG habitat could decrease tribal opportunities to access pine nutting areas and juniper trees, although site-specific NEPA analyses completed prior to the implementation of any thinning project would include additional government-to-government consultation with tribes in order to avoid or minimize impacts on tribal concerns. Nevada tribes also hold federal grazing permits that result in economic benefits. Those tribes also recognize that livestock grazing may lead to decreases in GRSG populations. Tribes that hold grazing permits attempt to balance the needs of maintaining traditional values with economic benefits realized through livestock grazing.

4.17.2. Nature and Type of Effects

The nature and type of most effects on tribal interests are general and non-quantifiable in nature. In general, activities that result in ground disturbance to lands currently or historically occupied by GRSG could decrease opportunities for tribes to maintain traditional cultural practices and values if these activities result in decreases in GRSG populations. These include, but are not necessarily limited to, granting ROWs/SUAs for road and highway construction, wind energy development, vegetation treatments within sagebrush communities, development of leasable, locatable, salable, and fluid minerals, OHV use, SRPs/RSUAs, livestock grazing, and wild horse management practices. In addition, natural processes that are impossible to control likely add to the human-caused impacts on GRSG listed above, including climate change, drought, and lightning-caused fires. The general impacts on tribal interests that could result through the implementation of each alternative analyzed in this EIS are described below.

Tribes expressed several concerns not analyzed in detail in this EIS. One concern was with sonic booms from low-flying military aircraft. The recent “F-35A Training Basing” EIS published by the United States Air Force in June, 2012, specifically analyzed the effects of low-flying military fighter jets on GRSG (USAF 2012). Effects analyzed in the F-35A EIS included noise, sonic booms, and jet-bird collisions. The F-35A EIS concluded that, based on previous scientific studies, the effects of sonic booms on wildlife were “of short duration and rarely result in injury or negative population effects” (USAF 2012). Specifically regarding GRSG, the F-35A EIS notes that few studies have been conducted on the effects of low-flying aircraft and sonic booms on lekking behavior and hatching success. However, such studies on similar upland game birds, including the wild turkey and bobwhite quail, found no decreased success rate in either breeding or hatching success from low-flying fighter jets producing sonic booms (USAF 2012).

The Summit Lake Tribe expressed concerns about on-going negotiations regarding road realignments and possible expansions of tribal reservation boundaries. The future status of these projects as they relate to GRSG planning efforts is unknown, but the potential approval of these types of projects or proposals would be subject to further analysis through the NEPA process or through legislative action.

Finally, tribes expressed concerns that hunting permits continue to be issued while GRSG populations are dwindling. None of the alternatives analyzed below specifically address this issue. The States of Nevada and California control GRSG hunting within the study area; federal agencies have no jurisdiction regarding appropriate levels of hunting.

4.17.3. Impacts Common to All Alternatives

Impacts on tribal interests that are common to all alternatives are applicable for Vegetation and Soils Management, Fire and Fuels Management, Wild Horse and Burro Management, Non-Energy Leasable Minerals Management, Fluid Minerals Management, Mineral split-estates Management, Renewable Energy Management, and Special Designations Management.

Impacts from Vegetation and Soils Management

Restoring sagebrush habitat and resting PPMAs/PGMAs from livestock grazing could enhance GRSG populations. If this is the case, then these practices could help to ensure the survival of traditional tribal practices such as observing lekking behavior in future generations. Resting allotments, however, could also decrease economic revenue for tribes holding grazing permits, but such impacts could be temporary if grazing levels were restored following resting periods.

Juniper and pinyon pine trees have both been identified as important to tribal communities for maintaining traditional cultural practices and values. Thinning or removal of juniper or pinyon pine trees could decrease tribal opportunities to maintain the practices and values centered upon these trees. However, site-specific NEPA analyses completed prior to the implementation of any thinning project would include additional government-to-government consultation with tribes in order to avoid or minimize impacts on tribal concerns.

Impacts from Fire and Fuels Management

Fire management activities, including prescribed burns and suppression tactics implemented to protect and preserve PPMAs/PGMAs could increase tribal opportunities for maintaining traditional cultural practices and values if their implementation resulted in increased or stable GRSG populations. In addition, tribal economic interests could be maintained by applying

appropriate and consistent grazing levels from year to year if fire and fuels management strategies help reduce the onset of catastrophic fires that result in the closing of grazing allotments permitted to tribes. Reductions in livestock grazing AUMs as part of fire/fuel management strategies, however, could decrease economic revenue to tribes that hold grazing permits.

Impacts from Wild Horse and Burro Management

Maintaining current wild horse and burro management strategies within PPMAs/PGMAs 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.

Impacts from Non-Energy Leasable Minerals Management

Closing PPMAs/PGMAs to non-energy leasable minerals could increase tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if the current leasing of non-energy minerals has led to decreases in GRSG populations.

Impacts from Leased Fluid Minerals Management

All alternatives propose to maintain approximately 43.7 million acres open to oil/gas and geothermal exploration and development upon leased lands within PPMAs/PGMAs. This could decrease tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if the leasing of fluid minerals has led to decreases in GRSG populations.

Impacts from Mineral Split-Estate Management

All alternatives are either silent or propose to maintain mineral split-estate lands open to locatable, salable, oil/gas and geothermal exploration and development within PPMAs/PGMAs. This could decrease tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if the permitting or leasing of minerals leads to decreases in GRSG populations.

Impacts from Renewable Energy Management

Because all alternative propose or could lead to ROW/SUAs exclusions and avoidance in PPMAs and/or PGMAs habitat for renewable energy development (wind and solar), this could result in increased tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if this management strategy leads to stable or increased GRSG populations in the future.

Impacts from Special Designations Management

All alternatives are either silent or propose to maintain current acreage of ACECs/RNAs without creating new ACECs/RNAs specifically to protect GRSG habitat. As a result, this action would be neutral in its impacts on tribes regarding their maintenance of traditional cultural practices and values. In addition, creating new ACECs/RNAs within allotments used by tribes for economic benefits through livestock grazing may result in reductions in AUMs and decreases in tribal economic benefits, so the 'no further action' proposed by all alternatives concerning ACECs/RNAs also would be neutral in its impacts on tribal economic concerns.

Alternatives C and F propose the creation of specific ACECs; in contrast, the remaining alternatives are silent or propose to maintain current acreage of ACECs/RNAs. However, no grazing changes are proposed within the ACECs of Alternatives C and F. As a result, this action

would be neutral in its impacts on tribes regarding their maintenance of traditional cultural practices and values. In addition, creating new ACECs/RNAs within allotments used by tribes for economic benefits through livestock grazing would not reduce AUMs or decrease tribal economic benefits, so the ACECs would be neutral in their impacts on tribal economic concerns.

4.17.4. Alternative A

Impacts from Greater Sage-Grouse Management

Management under Alternative A does not propose establishing PPMAs/PGMAs with special management goals and objectives for GRSG management. As a result, this alternative could lead to decreased opportunities for tribes to maintain traditional cultural practices and values such as observing lekking behavior if the non-establishment of PPMAs/PGMAs leads to future decreases in GRSG populations.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Unknown as this alternative is silent on specific drought management goals and objectives.

Impacts from Livestock Grazing Management

By closing 0 acres to grazing management within GRSG habitat, this alternative could lead to decreased opportunities for tribes to maintain traditional practices such as observing lekking behavior if current grazing management practices are decreasing GRSG populations. However, this alternative could help to maintain economic benefits to tribes that hold grazing permits if their current AUMs are not reduced in the future due to special management within GRSG habitat.

Impacts from Climate Change Management

Unknown as this alternative is silent on specific climate change management goals and objectives.

Impacts from Locatable Minerals Management

Petitioning to withdrawal 1.2 million acres of lands located within GRSG habitat from future mineral development could increase tribal opportunities to practice traditional cultural behavior and values such as observing lekking behavior if this management strategy stabilizes or increases GRSG populations.

Impacts from Salable Minerals Management

Closing approximately 1.2 million acres could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Unleased Fluid Minerals Management

Unknown as this alternative is silent on specific unleased fluid minerals management goals and objectives.

Impacts from Land Uses and Realty Management

This alternative is expected to maintain tribal access to pine nutting areas and observing lekking behavior because future access to these areas would likely be maintained at current levels.

Impacts from Comprehensive Travel and Transportation Management

This alternative would leave approximately 16.8 million acres open without travel restrictions or open but limited to travel on existing roads within GRSG habitat. This would likely maintain current tribal access to important pine nutting areas and juniper trees used to maintain traditional tribal cultural practices and values.

Impacts from Recreation Management

Unknown as this alternative is silent on specific recreation management goals and objectives.

4.17.5. Alternative B

Impacts from Greater Sage-Grouse Management

Management under Alternative B would propose to establish approximately 17.7 million acres as PPMAs/PGMAs and establish management goals and objectives for specific resources within PPMAs/PGMAs 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.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

This alternative is silent on specific drought management goals and objectives.

Impacts from Livestock Grazing Management

By closing 0 acres to grazing management within PPMAs/PGMAs, this alternative could lead to decreased opportunities for tribes to maintain traditional practices such as observing lekking behavior if current grazing management practices are decreasing GRSG populations. However, this alternative could help to maintain economic benefits to tribes that hold grazing permits if their current AUMs are not reduced in the future due to special management within PPMAs/PGMAs.

Impacts from Climate Change Management

This alternative is silent on specific climate change management goals and objectives.

Impacts from Locatable Minerals Management

Withdrawing 17.6 million acres within PPMAs/PGMAs from future mineral development could increase tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if the current permitting of locatable minerals has led to decreases in GRSG populations.

Impacts from Salable Minerals Management

Closing approximately 17.6 million acres could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Unleased Fluid Minerals Management

Closing approximately 17.7 million acres (with exceptions) of unleased lands for oil/gas and geothermal exploration could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Land Uses and Realty Management

Because this alternative proposes ROW/SUAs avoidance in PPMAs and/or PGMAs habitat, this could result in decreased opportunities for tribes to maintain traditional practices through restrictions imposed on access to pine nutting areas and observing lekking behavior. However, exceptions to tribes to access current areas used for traditional practices could be granted in future site-specific NEPA analyses.

Impacts from Comprehensive Travel and Transportation Management

This alternative would leave approximately 16.8 million acres open without travel restrictions or open but limited to travel on existing roads within PPMAs/PGMAs. This would likely maintain current tribal access to important pine nutting areas and juniper trees used to maintain traditional tribal cultural practices and values.

Impacts from Recreation Management

Allowing BLM SRPs and recreational SUAs in PPMAs only if they have neutral or beneficial benefits to GRSG populations could lead to increased opportunities for tribes to maintain traditional practices and values such as observing lekking behavior if current management strategies approving SRPs and recreational SUAs such as OHV race events contribute to decreases in GRSG populations.

4.17.6. Alternative C

Impacts from Greater Sage-Grouse Management

Management under Alternative C would propose 17,732,900 million acres as PPMAs and establish management goals and objectives for specific resources within PPMAs 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.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Unknown as this alternative is silent on specific drought management goals and objectives.

Impacts from Livestock Grazing Management

By closing nearly 18 million acres to grazing management, including all acres within PPMAs, this alternative could lead to increased opportunities for tribes to maintain traditional practices such as observing lekking behavior if this grazing management strategy leads to stable or increases in future GRSG populations. However, this alternative may lead to decreases in economic revenue to tribes holding grazing permits if their current AUMs are reduced.

Impacts from Climate Change Management

Unknown as this alternative is silent on specific climate change management goals and objectives.

Impacts from Locatable Minerals Management

Petitioning to withdrawal 12.6 million acres of lands located within PPMAs/PGMAs from future mineral development could increase tribal opportunities to practice traditional cultural behavior and values such as observing lekking behavior if this management strategy stabilizes or increases GRSG populations.

Impacts from Salable Minerals Management

Closing approximately 12.6 million acres could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Unleased Fluid Minerals Management

Unknown as this alternative is silent on specific unleased fluid minerals management goals and objectives.

Impacts from Land Uses and Realty Management

Because this alternative proposes ROW/SUA avoidance in PPMAs, this could result in decreased opportunities for tribes to maintain traditional practices through restrictions imposed on access to pine nutting areas and observing lekking behavior. However, exceptions to tribes to access current areas used for traditional practices could be granted in future site-specific NEPA analyses.

Impacts from Comprehensive Travel and Transportation Management

This alternative would leave approximately 47.1 million acres open without travel restrictions or open but limited to travel on existing roads within PPMAs. This would likely maintain current tribal access to important pine nutting areas and juniper trees used to maintain traditional tribal cultural practices and values.

Impacts from Recreation Management

Unknown as this alternative is silent on specific recreation management goals and objectives.

4.17.7. Alternative D

Impacts from Greater Sage-Grouse Management

Management under Alternative D would propose approximately 17.7 million acres as PPMAs/PGMAs and establish management goals and objectives for specific resources within PPMAs/PGMAs 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.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

This alternative proposes that District Managers or District Rangers consider changes to livestock grazing management within PPMAs/PGMAs to take into account drought conditions. This

management strategy could decrease the economic revenue of tribes that hold livestock grazing permits.

Impacts from Livestock Grazing Management

By closing 0 acres to grazing management within PPMAs/PGMAs, this alternative could lead to decreased opportunities for tribes to maintain traditional practices such as observing lekking behavior if current grazing management practices are decreasing GRSG populations. However, this alternative could help to maintain economic benefits to tribes that hold grazing permits if their current AUMs are not reduced in the future due to special management within PPMAs/PGMAs.

Impacts from Climate Change Management

Considering climate change and its effects on current and potential future changes in vegetation patterns in order to manage GRSG habitat may include treatments to eradicate invasive species, removal of pinyon-juniper trees that have encroached into sagebrush habitats in lower elevations, and increasing the connectivity of sagebrush habitats. These management goals could increase opportunities for tribes to maintain traditional cultural practices and values such as observing lekking behavior if these management strategies stabilize or increase GRSG populations. The removal of pinyon-juniper trees could decrease tribal opportunities for pine nutting and using juniper trees in traditional practices. However, site-specific NEPA analyses completed prior to the implementation of any thinning project or removal of pinyon-juniper habitat would include additional government-to-government consultation with tribes in order to avoid or minimize impacts on tribal concerns.

Impacts from Locatable Minerals Management

Petitioning to withdrawal 6.1 million acres of lands located within PPMAs/PGMAs from future mineral development could increase tribal opportunities to practice traditional cultural behavior and values such as observing lekking behavior if this management strategy stabilizes or increases GRSG populations.

Impacts from Salable Minerals Management

Closing approximately 17.7 million acres could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Unleased Fluid Minerals Management

Applying NSO stipulations (no exceptions) within PPMAs and NSO within PGMAAs (with exceptions) to unleased lands for oil/gas and geothermal exploration could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the NSO stipulations result in increases or stabilization of GRSG populations.

Impacts from Land Uses and Realty Management

Because this alternative proposes ROW/SUA avoidance in PPMAs and/or PGMAAs habitat, this could result in decreased opportunities for tribes to maintain traditional practices through restrictions imposed on access to pine nutting areas and observing lekking behavior. However, exceptions to tribes to access current areas used for traditional practices could be granted in future site-specific NEPA analyses.

Impacts from Comprehensive Travel and Transportation Management

This alternative would leave approximately 47.1 million acres open without travel restrictions or open but limited to travel on existing roads within PPMAs/PGMAs. This would likely maintain current tribal access to important pine nutting areas and juniper trees used to maintain traditional tribal cultural practices and values.

Impacts from Recreation Management

Allowing BLM SRPs and recreational SUAs in PPMAs only if they have neutral or beneficial benefits to GRSG populations could lead to increased opportunities for tribes to maintain traditional practices and values such as observing lekking behavior if current management strategies approving SRPs and RSUAs such as OHV race events contribute to decreases in GRSG populations.

4.17.8. Alternative E

Impacts from Greater Sage-Grouse Management

Management under Alternative E would not propose establishing PPMAs/PGMAs acres. Nevertheless, it does propose special management goals and objectives for GRSG management 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.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

Unknown as this alternative is silent on specific drought management goals and objectives.

Impacts from Livestock Grazing Management

Unknown as this alternative is silent on specific grazing management goals and objectives.

Impacts from Climate Change Management

Unknown as this alternative is silent on specific climate management goals and objectives.

Impacts from Locatable Minerals Management

Petitioning to withdrawal 0 acres from future mineral development within PPMAs/PGMAs could lead to decreases in opportunities for traditional tribal practices such as observing lekking behavior if the current permitting of mineral developments is leading to decreases in GRSG populations.

Impacts from Salable Minerals Management

Closing 0 acres from future mineral material disposal within PPMAs/PGMAs could lead to decreases in opportunities for traditional tribal practices such as observing lekking behavior if the current permitting of mineral materials is leading to decreases in GRSG populations.

Impacts from Unleased Fluid Minerals Management

This alternative proposes to maintain all unleased lands within PPMAs/PGMAs open to oil/gas and geothermal exploration and development. This could decrease tribal opportunities to maintain

specific traditional practices and values such as observing lekking behavior if the leasing of fluid minerals leads to decreases in GRSG populations.

Impacts from Land Uses and Realty Management

This alternative is expected to maintain tribal access to pine nutting areas and observing lekking behavior because future access to these areas would likely be maintained at current levels.

Impacts from Comprehensive Travel and Transportation Management

Unknown as this alternative is silent on specific travel management goals and objectives.

Impacts from Recreation Management

Allowing BLM SRPs and recreational SUAs such as OHV race events in PPMAs (with mitigation) could lead to decreased opportunities for tribes to maintain traditional practices and values such as observing lekking behavior if approving such events contribute to decreases in GRSG populations.

4.17.9. Alternative F

Impacts from Greater Sage-Grouse Management

Management under Alternative F would propose approximately 17.7 million acres as PPMAs/PGMAs and establish management goals and objectives for specific resources within PPMAs/PGMAs 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.

Impacts from Riparian Areas, Wetlands, and Water Resources Management

This alternative is silent on specific drought management goals and objectives.

Impacts from Livestock Grazing Management

By not closing any acres to grazing management within PPMAs/PGMAs, this alternative could lead to decreased opportunities for tribes to maintain traditional practices such as observing lekking behavior if current grazing management practices are decreasing GRSG populations. However, this alternative could help to maintain economic benefits to tribes that hold grazing permits if their current AUMs are not reduced in the future due to special management within PPMAs/PGMAs.

Impacts from Climate Change Management

This alternative is silent on specific climate management goals and objectives.

Impacts from Locatable Minerals Management

Withdrawing 17.7 million acres within PPMAs/PGMAs from future mineral development could increase tribal opportunities to maintain specific traditional practices and values such as observing lekking behavior if the current permitting of locatable minerals has led to decreases in GRSG populations.

Impacts from Salable Minerals Management

Closing approximately 17.7 million acres could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Unleased Fluid Minerals Management

Closing all unleased lands within PPMAs/PGMAs (with exceptions) to further oil/gas and geothermal exploration and development could increase the opportunities for tribes to participate in traditional cultural practices such as observing lekking behavior if the closures result in increases or stabilization of GRSG populations.

Impacts from Land Uses and Realty Management

Because this alternative proposes ROW/SUA avoidance in PPMAs and/or PGMAs habitat, this could result in decreased opportunities for tribes to maintain traditional practices through restrictions imposed on access to pine nutting areas and observing lekking behavior. However, exceptions to tribes to access current areas used for traditional practices could be granted in future site-specific NEPA analyses.

Impacts from Comprehensive Travel and Transportation Management

This alternative would leave approximately 47.1 million acres open without travel restrictions or open but limited to travel on existing roads within PPMAs/PGMAs. This would likely maintain current tribal access to important pine nutting areas and juniper trees used to maintain traditional tribal cultural practices and values.

Impacts from Recreation Management

Allowing BLM SRPs and recreational SUAs in PPMAs only if they have neutral or beneficial benefits to GRSG populations could lead to increased opportunities for tribes to maintain traditional practices and values such as observing lekking behavior if current management strategies approving SRPs and SUAs such as OHV race events contribute to decreases in GRSG populations.

4.18. Climate Change

4.18.1. Methods and Assumptions

Indicators

Indicators of impacts on GRSG are as follows:

- Change in available habitat for GRSG
- More areas closed to activities that contribute to greenhouse gas emissions

Assumptions

The analysis includes the following assumptions:

- There is a correlation between global concentrations of greenhouse gases and climate change.

- Future changes in precipitation and temperature regimes due to climate change will result in changes in vegetation, fire and fuels and water availability.

4.18.2. Nature and Type of Effects

Management actions that could affect climate change would include actions that increase GHG emissions, actions that reduce GHGs emissions, actions that create carbon sinks, and actions that eliminate or damage carbon sinks.

While GHG emissions or carbon sequestration may result from many of the proposed management actions, these changes would be quite small relative to state, national, or global GHG emissions. Relative to state and national GHG emissions, emission changes due to management actions associated with this LUPA would be negligible.

Implementing management for the following resources would have negligible or no impact on climate change and are therefore not discussed in detail: CTTM, recreation, lands and realty, range management, mineral split-estate, and ACECs.

4.18.3. Impacts Common to All Alternatives

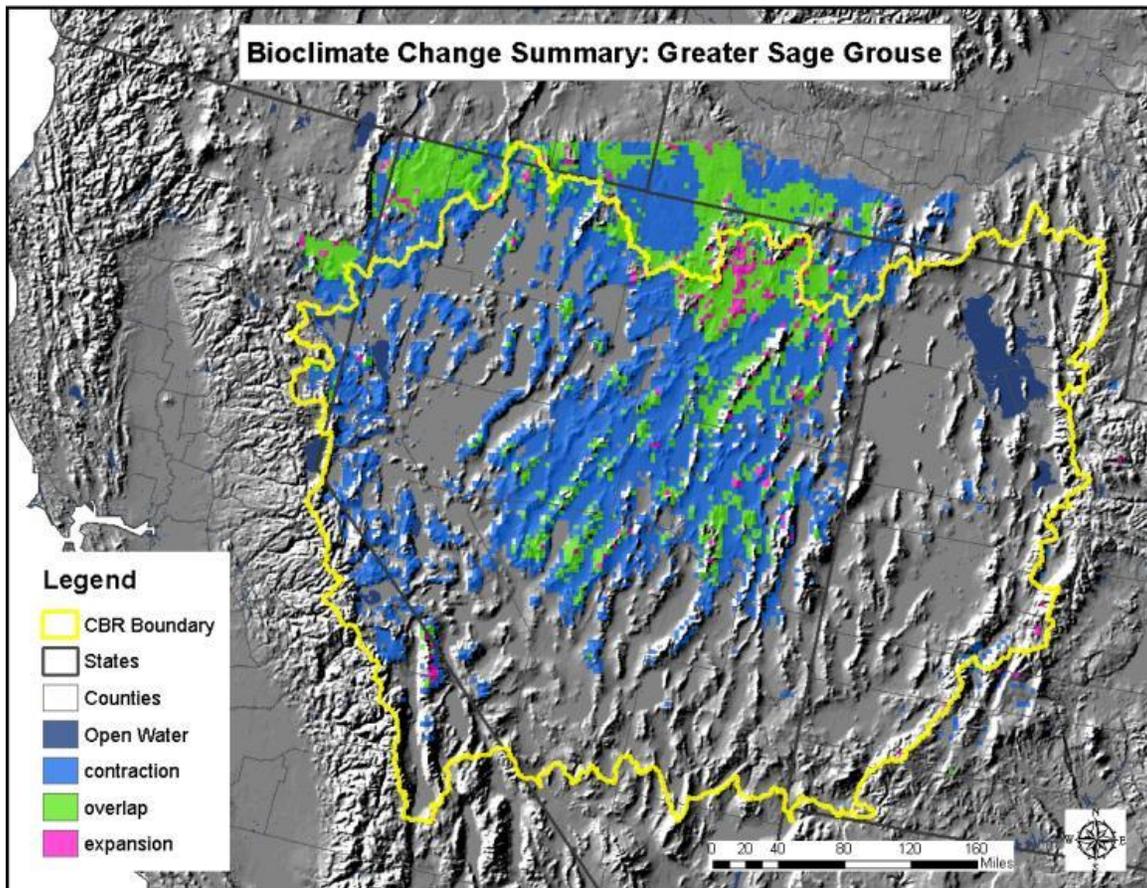
The Central Basin and Range REA developed climate envelope models to provide an indication of the magnitude and direction shift in climate regime as it relates to the current distribution of upland conservation elements (Comer et al. 2012a). These models indicate potential changes in vegetation species or distributions based solely on climatic changes and are not an attempt at predicting actual species movement since that can be a result of several factors (Comer 2012a). These climate envelopes were developed for the 2060 timeframe for a few species including pinyon-juniper woodland, big sagebrush shrubland, mixed salt desert scrub, and GRSG. Within these models, ‘contraction’ indicates areas where the current climate characteristics will be replaced by a different climate regime. Overlap indicates areas where current climate characteristics will remain the same. ‘Expansion’ indicates where the climate regime for a modeled resource is forecasted to occur outside of the current distribution.

Results of the climate envelopes for the conservation elements of interest within PPMAs/PGMAs are shown in Figures 4-1 to 4-5. Common among the vegetation assemblages, each model showed a shift in the movement and direction of assemblages in both elevation and a northerly direction. Between the sagebrush and salt desert scrub assemblages, it appears that where sagebrush is predicted to contract, salt desert scrub is predicted to expand. Additionally, salt desert scrub appears to be contracting mostly in the south where there could be potential for increasing Mojave species. This transition seems likely when coupled with the predicted temperature changes. Areas where future vegetation may become sparser could also become more susceptible to wind erosion, resulting in increasing expanses of desert pavement.

Climate envelope results for the GRSG show a potential for a considerable change in GRSG core occupied habitat. The majority of the existing habitat will see contraction. Areas with overlap are located mostly in the north with little expansion of habitat (see **Figure 4-1**, Climate Envelope Changes for GRSG (Core Occupied Habitat) as of 2060). This map indicates where between 1 and 8 types are forecasted by 2060 to have climate envelopes overlapping current distributions; thus providing one indication of potential habitat resilience to climate-change refugia from Comer et al. 2012a.

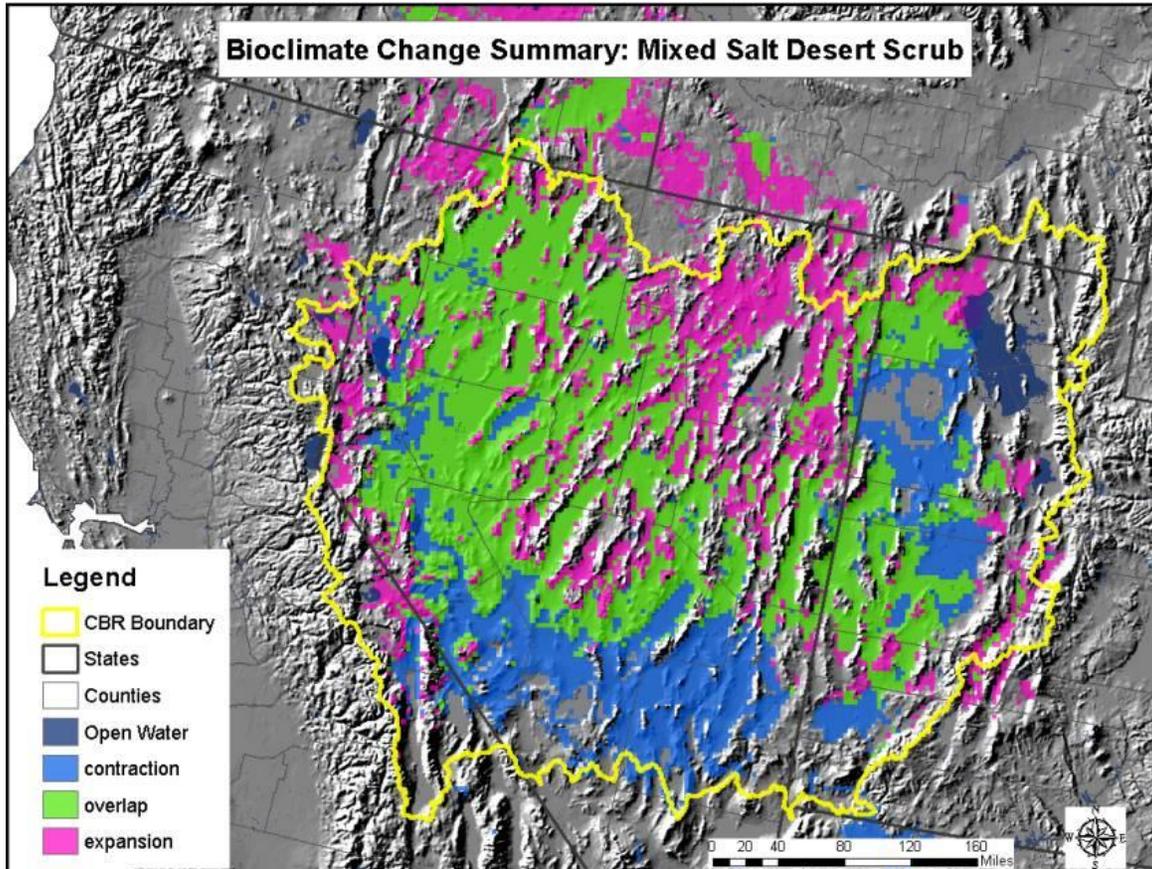
Figure 4-2, Forecasted Climate Envelope Changes for Inter-Mountain Basins Mixed Salt Desert Scrub as of 2060; **Figure 4-3**, Forecasted Climate Envelope Changes for Great Basin Pinyon-Juniper Woodland as of 2060; and **Figure 4-4**, Forecasted Climate Envelope Changes for Inter-Mountain Basins Big Sagebrush Shrubland Within the Central Basin and Range as of 2060, show the bioclimate change envelopes for these of these vegetation communities.

For the pinyon-juniper assemblage, it appears that expansion will mostly occur to the north and most of the contraction areas appear to occur at higher elevations. The majority of the pinyon-juniper habitat appears to overlap existing habitat.



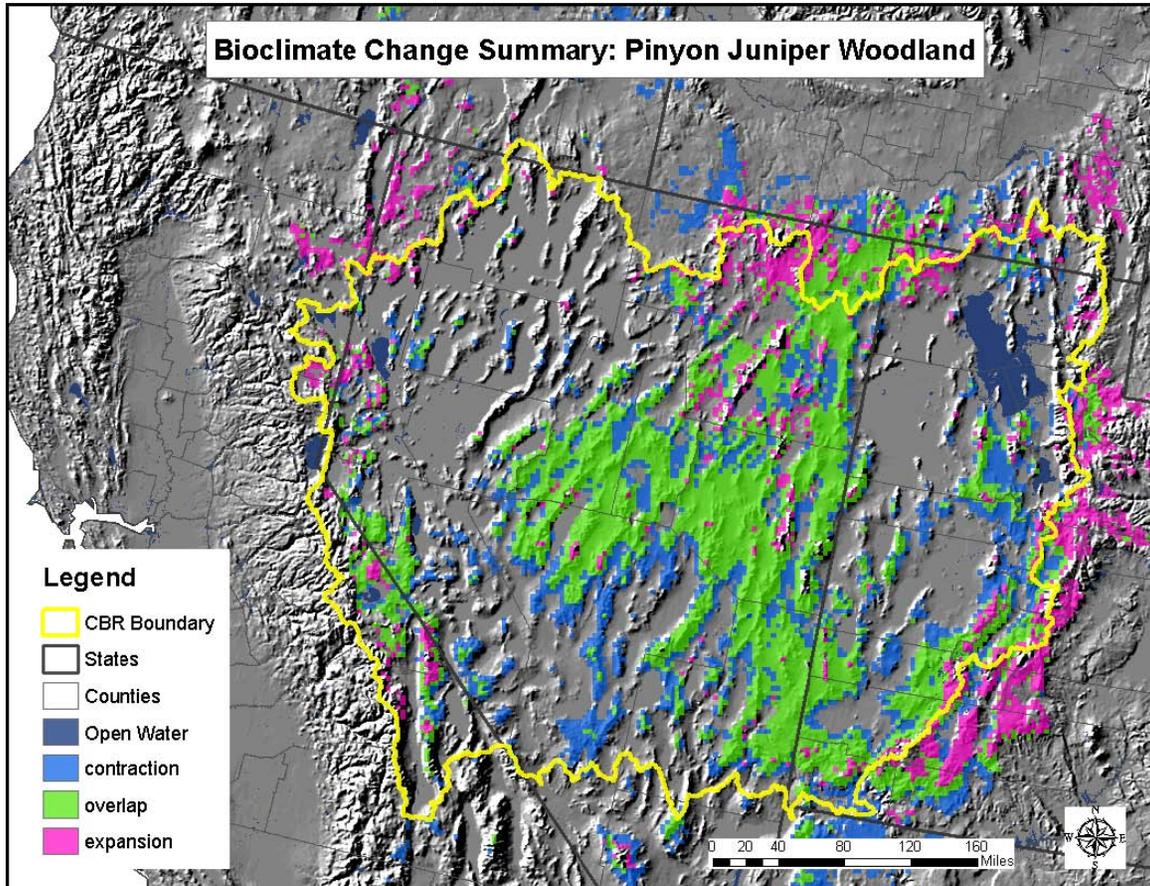
(Comer et al. 2012a).

Figure 4.1. Climate Envelope Changes for Greater Sage-Grouse (Core Occupied Habitat) as of 2060



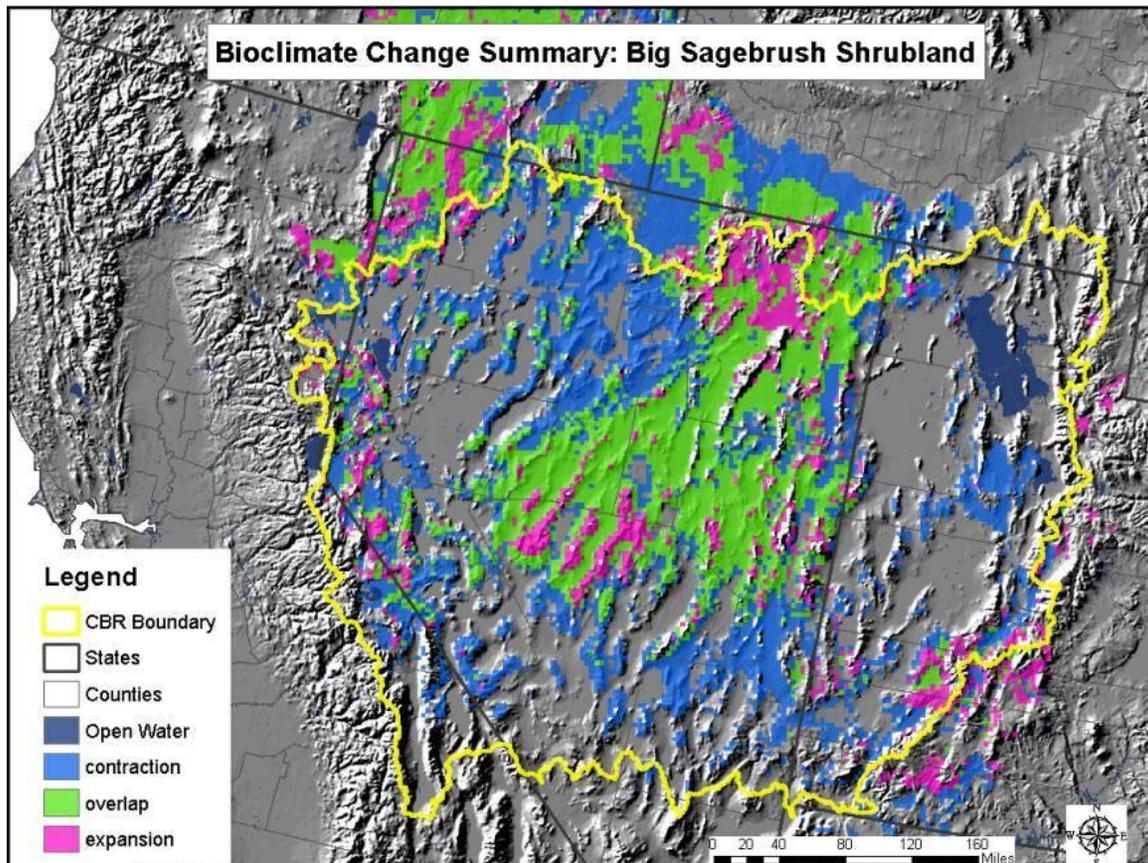
Results for each category (contraction, overlap, expansion) reflect agreement among 2 or more of 6 distinct spatial models (Comer et al. 2012a).

Figure 4.2. Forecasted Climate Envelope Changes for Inter-Mountain Basins Mixed Salt Desert Scrub as of 2060



Results for each category (contraction, overlap, expansion) reflect agreement among 2 or more of 6 distinct spatial models (Comer et al. 2012a).

Figure 4.3. Forecasted Climate Envelope Changes for Great Basin Pinyon-Juniper Woodland as of 2060



Results for each category (contraction, overlap, expansion) reflect agreement among 2 or more of 6 distinct spatial models (Comer et al. 2012a).

Figure 4.4. Forecasted Climate Envelope Changes for Inter-Mountain Basins Big Sagebrush Shrubland Within the Central Basin and Range as of 2060

This could result in shifts in vegetation changes between sagebrush-dominated low elevations to more pinyon-juniper woodlands as well as altering current wildfire dynamics (Comer et al. 2012a).

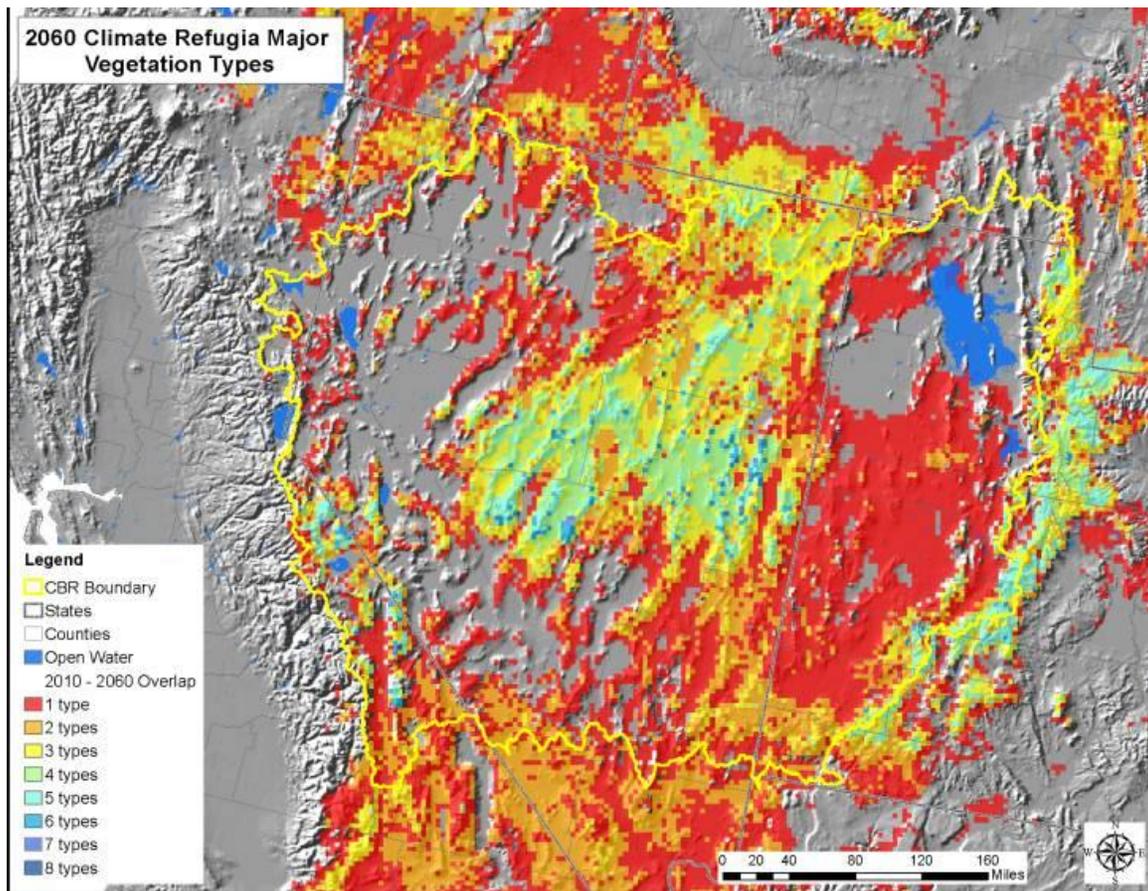
Figure 4-5, Potential Climate Change Refugia Based on 2060 Forecasts of Climate Envelopes for Major Vegetation Types within the Ecoregion, displays the combining of the climate change envelopes for the major vegetation classes by overlaying the results of each forecast. By displaying the ‘overlap’ areas for each vegetation type climate envelope forecast and focusing on where multiple ‘overlap’ areas intersect, one can identify where future climate regimes will potentially be the same as today (Comer et al. 2012a). These areas could be further evaluated and identified as potential GRSG focal areas.

As discussed in the affected environment, the climate change forecast for temperature showed increases in daily maximum temperatures. The forecast for precipitation showed no strong trend toward either wetter or drier conditions for a majority of the planning area. This could mean that the current conditions of several years of drought with a few wet years could continue on into the future. Increasing temperatures coupled with the existing precipitation patterns could have an effect on the timing and quantity of water availability in most watersheds. Smaller snowpack melting earlier in the spring will result in earlier peak flows in streams and lower base flows later in the year. Lower base flows during typical drought years will be more severe and could result

in loss of flows in several stream and spring systems and loss of riparian habitat. Additionally, changes in timing of peak flows could impact storage potential in existing reservoirs.

This map indicates where between 1 and 8 types are forecasted by 2060 to have climate envelopes overlapping current distributions; thus providing one indication of potential climate-change refugia from Comer et al. 2012a.

Implementing management for the following resources would have negligible or no impact on climate change and are therefore are not discussed in detail: mineral split-state, livestock grazing, wild horse and burro management, riparian areas and wetland management, recreation management, CTTM, renewable energy, lands and realty, and ACECs.



(Comer et al. 2012a)

Figure 4.5. Potential Climate-Change Refugia Based on 2060 Forecasts of Climate Envelopes for Major Vegetation Types within the Ecoregion

4.18.4. Alternative A

Climate impacts under Alternative A are identical to impacts resulting from current management as described above in Nature and Type of Effects and Impacts Common to All Alternatives. No changes to GHG emissions would occur.

4.18.5. Alternative B

Management under Alternative B would constrain resource use and would decrease any GHG emissions associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Management under Alternative B would result in overall conservation of PPMAs and PGMAs reducing anthropogenic disturbances and potential for GHG emissions.

Impacts from Vegetation and Soils Management

Same as Alternative A.

Impacts from Fire and Fuels Management

Alternative B does not specify any specific numbers of acres for hazardous fuels management nor does it specify suppression activities. It does identify general actions for pre- and post-fire treatment activities, timing of treatments, resting, and use of native plants for revegetation. Based on these actions, Alternative B could have fewer impacts on climate change than Alternative A.

Impacts from Locatable Minerals Management

Management under Alternative B would identify 12,693,500 acres within PPMA and 374,700 acres within PGMA petitioned for withdrawal from mineral entry and 4,664,700 acres as open to locatable mineral exploration or development. Mining activities results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment (EPA 2012); it also removes vegetation and releases sequestered carbon. Closing areas of high potential to development would have the potential to result in fewer releases of GHGs in the planning area as compared with Alternative A.

Impacts from Salable Minerals Management

Under Alternative B, 12,693,500 acres within PPMA and 374,700 acres within PGMA would be managed as closed to mineral material disposal and 4,664,700 acres as open for consideration for mineral material disposal on a case-by-case basis. Mining activities results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment (EPA 2012); it also removes vegetation and releases sequestered carbon. Closing areas of high potential to development would have the potential to result in fewer releases of GHGs in the planning area as compared with Alternative A.

Impacts from Leasable Minerals Management

Under Alternative B 12,693,500 acres within PPMA and 374,700 acres within PGMA would be managed as closed and 4,664,700 acres would be managed as open to fluid minerals, oil and gas, and geothermal. In addition, this alternative identifies actions and conservation measures for areas that are already leased. Oil and gas development results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment (EPA 2012); it also removes vegetation and releases sequestered carbon. Closing areas of high potential to development would have the potential to result in fewer releases of GHGs in the planning area as compared with Alternative A.

4.18.6. Alternative C

Management under Alternative C would constrain resource use and would decrease any GHG emissions associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

GHG emissions would be less than under Alternative A. Removing grazing would change habitat conditions, potentially increasing resistance to climate change effects.

Impacts from Vegetation and Soils Management

Same as Alternative A.

Impacts from Fire and Fuels Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Same as Alternative B.

Impacts from Locatable Minerals Management

Same as Alternative B.

Impacts from Salable Minerals Management

Same as Alternative B.

4.18.7. Alternative D

Management under Alternative D would constrain resource use and would decrease any GHG emissions associated with a particular use compared with Alternative A.

Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Same as Alternative B.

Impacts from Vegetation and Soils Management

Alternative D does not identify any specific numbers of acres for vegetation treatment; however, it does have several actions specifying types of treatments and timing. Based on the actions associated with Alternative D, there should be fewer impacts on climate change overall than in Alternative A.

Impacts from Fire and Fuels Management

Alternative D does not specify any specific numbers of acres for hazardous fuels management. It does identify general actions for suppression activities, pre- and post-fire treatment activities,

timing of treatments, resting, and use of native plants for revegetation. Based on these actions, Alternative D could have fewer impacts on climate change than Alternative A.

Impacts from Leasable Minerals Management

Under Alternative D within PPMA and PGMA, 1,670,800 acres would be managed as closed to fluid minerals, oil and gas and geothermal and manage 16,061,900 acres as open to fluid minerals, oil and gas and geothermal. In addition, management would list stipulations for No Surface Occupancy in priority GRSG habitat for currently unleased areas and conservation measures for reducing land disturbance on leased areas. Management under Alternative D would result in fewer impacts on climate change than Alternative A. Oil and gas development results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment (EPA 2012); it also removes vegetation and releases sequestered carbon. Closing areas of high potential to development would have the potential to result in fewer releases of GHGs in the planning area as compared with Alternative A.

Impacts from Locatable Minerals Management

Same as Alternative A.

Impacts from Salable Minerals Management

Management under Alternative D within PPMA and PGMA would manage 17,732,900 acres as closed to mineral material disposal and 0 acres as open for consideration for mineral material disposal on a case-by-case basis. Management under Alternative D would result in fewer impacts on climate change than Alternative A. Mining activities results in short-term and long-term emissions of GHGs during fuel combustion in vehicles, drill rigs, and construction equipment (EPA 2012); it also removes vegetation and releases sequestered carbon. Closing areas of high potential to development would have the potential to result in fewer releases of GHGs in the planning area as compared with Alternative A.

4.18.8. Alternative E

Alternative E does not outline specific management actions and would result in similar impacts on climate change as Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Same as Alternative B.

Impacts from Vegetation and Soils Management

Alternative E does not identify any specific numbers of acres for vegetation treatment nor does it identify any general actions specifying types of treatments and timing. Impacts are the same as Alternative A.

Impacts from Fire and Fuels Management

Alternative E does not specify any specific numbers of acres for hazardous fuels management or post-fire rehabilitation treatments. It does identify general actions for suppression activities, particularly associated with improving initial attack suppression actions. Based on these actions, Alternative E could have fewer impacts on climate change than Alternative A.

Impacts from Locatable Minerals Management

Same as Alternative A.

Impacts from Salable Minerals Management

Same as Alternative A.

Impacts from Leasable Minerals Management

Same as Alternative A.

4.18.9. Alternative F

Alternative F generally constrains resource use and would decrease any GHG emissions associated with a particular use compared with Alternative A. Resources affected are described below.

Impacts from Greater Sage-Grouse Management

Same as Alternative B.

Impacts from Vegetation and Soils Management

Under this alternative, there would be a 3 percent cap on disturbance within GRSG habitat. Once the 3 percent disturbance is met, no new activities that result in land disturbance would be authorized. This would have an overall benefit on climate change. Management under Alternative F would result in fewer impacts than Alternative A.

Impacts from Fire and Fuels Management

Under this alternative, there would be a 3 percent cap on disturbance within GRSG habitat. Once the cap is met, no new activities that would result in land disturbance would be authorized. This would have an overall benefit on climate change. Management under Alternative F would result in fewer impacts than Alternative A.

Impacts from Leasable Minerals Management

Under this alternative, there would be a 3 percent cap on disturbance within GRSG habitat. Once the cap is met, no new activities that would result in land disturbance would be authorized. This would have an overall benefit on climate change. Management under Alternative F would result in fewer impacts than Alternative A.

Impacts from Locatable Minerals Management

Under this alternative, there would be a 3 percent cap on disturbance within GRSG habitat. Once the cap is met, no new activities that would result in land disturbance would be authorized. This would have an overall benefit on climate change. Management under Alternative F would result in fewer impacts than Alternative A.

Impacts from Salable Minerals Management

Under this alternative, there would be a 3 percent cap on disturbance within GRSG habitat. Once the cap is met, no new activities that would result in land disturbance would be authorized.

This would have an overall benefit on climate change. Management under Alternative F would result in fewer impacts than Alternative A.

4.19. Socioeconomics and Environmental Justice

This section discusses social and economic impacts from proposed GRSG management actions related to other resources and resource uses. Existing social and economic conditions are described in **Section 3.23**, Socioeconomics and Environmental Justice. This section also addresses environmental justice impacts and the differences between alternatives for the social and economic impacts identified.

4.19.1. Methodology and Assumptions

For the analysis of economic impacts, quantitative estimates are provided where sufficient data or estimates are available. IMPLAN was used to estimate impacts on outcomes, employment, and earnings in the study area, including those derived from the multiplier effect. The multiplier effect captures the impact of initial expenditures on subsequent rounds of expenditures derived from the initial income generated as well as the impact of initial expenditures in one sector of the economy on other interrelated sectors. This allows for a more complete picture of the economic impacts of the management alternatives in the planning area.

For the analysis of social impacts, two other types of impacts were considered. The first is that derived from migration induced by management actions. These impacts are induced by economic opportunities that drive population into or out of specific areas and affect population growth as well as the demand for housing and public services. The second is that associated with specific interest groups, community livelihoods, or minority and low income populations (Environmental Justice).

The following are summaries of the types of social and economic impacts and associated indicators of those impacts, from management actions related to the protection of GRSG within the study area:

- Direct economic activity dependent on BLM-administered and Forest Service-administered land and resource management
 - Qualitative assessment of the volume of economic activity dependent on BLM-administered and Forest Service-administered lands and resources
 - Indirect impacts could be changes in economic activity
- Overall employment, earnings, output, and earnings per job associated with economic activities impacted by management alternatives
 - Dollar value of output, earnings, and earnings per job; number of jobs
 - Indirect impacts would include changes in number of jobs
- Tax revenues and payments to states and counties
 - Dollar value of tax revenues

- Indirect impacts would include changes in tax revenues
- Other (nonmarket) values
 - Dollar value of consumer surplus associated with recreation activities; qualitative assessment of the non-use values attributable to GRSG populations and ranching activity
 - Indirect impacts would include changes in nonmarket values
- Population
 - Qualitative assessment of potential increase or decrease in population
 - Indirect impacts would include changes in population
- Housing and public services
 - Qualitative assessment of local availability of housing and public services
 - Indirect Impacts would include changes in availability of housing and public services.
- Consistency with county LUPs
 - Qualitative assessment of consistency with county LUPs
- Interest groups and communities of place
 - Qualitative assessment of alignment with interest group objectives and community livelihoods
- Environmental Justice
 - Disproportionately high and adverse human health and/or environmental impacts

Assumptions

The following list presents the basic assumptions related to social and economic impact assessment for Alternatives A through F.

- The analysis of economic impacts of management alternatives on grazing uses billed AUMs as a baseline, estimated as a ten-year average share of active AUMs. Active AUMs measure the amount of forage from land available for grazing. Forest Service terms this measure “permitted” AUMs. Billed AUMs measure the amount of forage for which BLM and Forest Service bill annually. Forest Service uses the term “authorized” AUMs for the same concept. The analysis uses two scenarios to describe a range of potential economic impacts of management alternatives on economic activity related to livestock grazing.
- The quantitative (model-based) analysis of management alternatives affecting oil and gas development on federal lands assumes that operators who are unable to drill on federal lands would not access the same oil and gas from nearby private or state lands. This assumption makes the model-based analysis more conservative, showing worse impacts than might be the case. Note, however, that a shift to private or state lands could occur, meaning that the economic impacts of reduced drilling and production on federal lands could be softened by the concomitant increase in drilling on private or state lands.

Based on available information, several resource uses would not result in measurable or systematic social or economic impacts that would differ by alternative. Therefore, resource uses that are not discussed in detail are ACECs, wild horses and burros, solar energy, and wildland fire management. Effects regarding effectiveness and efficiency of implementing agency actions to achieve these objectives and resource outcomes are presented in respective resource sections within **Chapter 4** and are not restated in this section to avoid redundancy.

The analysis also does not address solar energy development in detail. There are no existing solar projects on GRS habitat in the study area, and GRS habitat does not overlap any Solar Energy Zones. The BLM also has not received any applications for solar energy development on GRS habitat in the study area, and does not anticipate receiving any such applications. Therefore, the BLM does not anticipate any economic impacts associated with solar energy development across any of the alternatives. For further information, see **Section 4.16**, Renewable Energy.

4.19.2. Economic Impacts

Impacts from Management Actions Affecting Grazing Allotments

Overall Employment, Earnings, and Output per Job Impacted by Management Alternatives

The potential impacts of management alternatives affecting grazing on output and employment were estimated quantitatively using the IMPLAN economic model. Detailed assumptions for the quantitative analysis are described in **Appendix O**, Economic Impact Analysis Methodology. Alternatives A, B, D, and E would have similar economic effects because they would maintain the same number of AUMs (AUMs would be reduced in Alternatives C and F). **Chapter 2**, Alternatives, and **Section 4.9**, Livestock Grazing, document other proposed management changes in detail, including changes in range improvements and vegetation treatments. This section focuses on the economic impacts of those changes.

Note that the holders of grazing permits would maintain the right to implement the authorization they have under the permit. Thus, there would be no access-related impacts on permittees' ability to manage their lands or livestock under any alternative. Estimates of impacts on jobs, earnings and output were obtained using the IMPLAN model. The model used 2011 data for active AUMs, except for active AUMs in the Humboldt-Toiyabe National Forest, for which 2012 data were used. The model used an average of 2000 to 2011 data for billed AUMs, because billed AUMs fluctuate from year to year.

From an economic perspective, the counties likely to be most affected by restrictions on livestock grazing would be those in which a relatively large portion of the economic base stems from livestock grazing. **Table 3-78**, Farm Earnings Detail, 2010 (2010 dollars), in **Section 3.23**, Socioeconomics and Environmental Justice, shows the approximate contribution of livestock grazing to overall county earnings, and indicates the counties in which livestock grazing contributes the greatest portion of overall earnings: Modoc (7.4 percent), Pershing (4.1 percent), and Nye (2.9 percent). In all other counties, the figure is lower than two percent.

As noted in **Section 3.23**, Socioeconomics and Environmental Justice, research has demonstrated that in most cases public land grazing permits increase ranch property value beyond the additional forage value provided, evidently because federal permits are perceived as adding semi-private open space to the property. Thus, any restrictions to grazing on public lands could result in reductions in property values for the ranches. The extent of any impact could vary depending on

the extent of restrictions of grazing on public lands, whether a grazing permit is not renewed in its entirety, and the land management decisions in the selected alternative. It should be noted that any premium to property values associated with a federal grazing permit is a result of amenity perception rather than ownership – since any public land grazing permit is associated with publicly, not privately, owned land.

Vegetation treatments in all alternatives would generally have the effect of improving ecological condition and rangeland health, which would generally sustain current livestock operations and be beneficial to both wildlife and livestock (as well as livestock operators and local communities and counties). Forage availability may increase in the long term due to improved land health and forage productivity. However, required rest periods following treatments may impact the ability of livestock operators to fully utilize permitted AUMs in the short term. These short-term impacts would be limited except in cases where treatments involve large numbers of acres. Also, weed control treatments would increase forage availability in the long term by improving native plant productivity.

The analysis calculated a range of economic impacts. The low impact scenario represents the case where ranchers continue to use as many of the initial billed AUMs as possible, using non-billed active AUMs as a buffer to absorb reductions in AUMs imposed by management alternatives. The high impact scenario represents the case where ranchers maintain a constant billed to active AUM ratio and reduce billed AUMs in proportion to the reduction in active AUMs. Further details are provided in Appendix O. **Table 4-29** Annual Impact of Management Actions Affecting Livestock AUMs on Output, Employment, and Earnings Compared to Alternative A, presents this range of estimates. Note that the employment estimates include the labor of farm proprietors, although not of unpaid family labor; if family labor were included, then labor use differences among alternatives would be larger.

Alternative A—Under Alternative A, grazing on federal lands would not be affected. There would be no change in annual output, annual jobs, or annual earnings. Based on the location of current federal grazing lands, the economic contribution of grazing would be similar to the pattern under current management, with particular concentrations in Modoc County, California, and the Nevada counties of Pershing and Nye.

Table 4.30. Annual Impact of Management Actions Affecting Livestock AUMs on Output, Employment, and Earnings Compared to Alternative A

	Alternatives B, D, and E ¹		Alternative C		Alternative F	
	Low	High	Low	High	Low	High
Output	See notes	See notes	-\$129.1	-\$143.1	-\$43.1	-\$89.4
Employment	See notes	See notes	-1,413	-1,565	-474	-978
Earnings	See notes	See notes	-\$47.1	-\$52.2	-\$15.7	-\$32.6

Source: Calculated using the IMPLAN model, applied to active AUMs for each alternative (BLM 2013e), as explained in the text and in **Appendix O**.

Note: Output and earnings are in millions of 2010 dollars.

1. Based on available AUMs, there would be no change in economic activity from grazing in Alternatives B, D, or E. However, as described in the text, management actions in Alternatives B and D would result in restrictions on livestock movement, vegetation treatments, and range improvements, which may increase ranch operators' costs or lead to other adverse economic impacts.

Alternative B—Under Alternative B, economic activity attributable to grazing on federal lands with GRSG habitat is likely to be broadly similar to Alternative A because there would

be no changes in the amount of GRSG habitat open for grazing. Some decisions on livestock movement, range improvements, and vegetation treatments would be subject to the conservation, enhancement, or restoration of GRSG habitat. As noted above, vegetation treatments would generally have the effect of improving ecological condition and rangeland health, as forage availability typically increases following vegetation treatments in the long term due to improved land health and forage productivity. However, required rest periods following treatments may impact the ability of livestock operators to fully utilize permitted AUMs in the short term. Seasonal restrictions could also be imposed, requiring that permittees move their livestock elsewhere, which would result in added costs to their operations. The extent to which these additional constraints would reduce grazing economic activity is not clear, but Alternative B would likely result in some reductions in economic activity compared to Alternative A.

Alternative C—Under Alternative C, economic activity attributable to grazing on federal lands would be reduced. PPMAs and PGMAs would be closed to livestock grazing, and livestock grazing on federal lands would be restricted to those allotments with no GRSG habitat. Adverse impacts on output, employment, and earnings would be greater in Alternative C than any other alternative. The economic impact of Alternative C may also be greater if the change in management actions, such as the removal of GRSG habitat from livestock grazing, impairs the economic viability of some grazing operations – especially if the land previously used by a ranch is then left deserted and unused.

Alternative D—Economic activity due to grazing on federal lands with GRSG habitat is likely to be similar to Alternatives A and B because there would be no changes in the amount of GRSG habitat open for grazing. As noted above, vegetation treatments would generally have the effect of improving ecological condition and rangeland health, as forage availability typically increases in the long term due to improved land health and forage productivity. However, required rest periods following treatments may impact the ability of livestock operators to fully utilize permitted AUMs in the short term. Some restrictions on range improvements to protect GRSG habitat, or seasonal restrictions that could require permittees to move livestock off-range to protect habitat, could affect the availability of forage, but to a lesser extent than Alternative B. The extent to which these additional constraints would affect economic activity from grazing on federal lands is not clear. However, Alternative D would likely result in some reductions in economic activity compared to Alternative A (and the magnitude of impact would be lower than in Alternative B).

Alternative E—Economic activity due to grazing on federal lands with GRSG habitat is likely to be similar to Alternatives A, B, and D because there would be no changes in the amount of GRSG habitat open for grazing. Vegetation treatments would generally have the effect of improving ecological condition and rangeland health, as forage availability increases in the long term due to improved land health and forage productivity. Required rest periods following treatments may impact the ability of livestock operators to fully utilize permitted AUMs in the short term. The extent to which these additional constraints would affect economic activity from grazing is not clear. However, Alternative E may result in some reductions in economic activity compared to Alternative A (in Nevada only; in California, the effects would be identical to Alternative A). The magnitude of impact would probably be lower than in Alternatives B or D.

Alternative F—Under Alternative F, economic activity due to grazing on federal lands would be reduced because of the closure of some PPMAs and PGMAs to livestock grazing, as well as the action to rest a portion of PPMAs and PGMAs each year and limit utilization levels. Economic impacts on output, employment, and earnings are shown in **Table 4-29** Annual Impact of Management Actions Affecting Livestock AUMs on Output, Employment, and Earnings

Compared to Alternative A. The impact of Alternative F may be greater than shown if the reduction in federal AUMs impairs the economic viability of some grazing operations; this would be truer if the land previously used by a ranch is then left deserted and unused.

Other Values Associated with Livestock Grazing

As described in **Chapter 3**, public land managed for livestock grazing provides both market values and nonmarket values; the latter include open space and western ranch scenery, which provide value to some residents and outside visitors, and ranches may also provide some value to the non-using public (e.g., the cultural icon of the American cowboy). Some residents and visitors also perceive nonmarket opportunity costs associated with livestock grazing; in addition, some of the lifestyle value of ranching is likely to be captured in markets (e.g., property values of ranches adjacent to public lands). The “Other Values” section in **Section 3.23**, Socioeconomics and Environmental Justice, and **Appendix N** provide additional discussion of these values. Overall, the process for incorporating potential nonmarket values associated with the management of public land for livestock grazing into analyses of net public benefits remains uncertain. Since the scientific and economic literature on the topic does not provide adequate data or a consensus theoretical framework from which to analyze these values further, the BLM and Forest Service did not attempt to quantify these values for the present study.

To the degree that there are net benefits associated with nonmarket values attached to livestock grazing and ranching, these would be greatest in Alternatives A and E, as both of these alternatives are likely to result in similar levels of livestock grazing operations in the study area. If the net nonmarket value associated with livestock grazing and ranching is positive, then that value would be greatest under Alternatives A and E, lower under Alternative D, lower still in Alternative B, lower in Alternative F, and lowest of all under Alternative C, in line with the expected impacts on market values discussed above.

Impacts from Management Actions Affecting Recreation

Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives

As discussed in **Chapter 3**, service related sectors, including many typically linked to recreational activities such as the accommodation and food services industry, are important sources of employment and earnings throughout the study area. Although management activities included in the proposed alternatives could affect recreational activities (e.g., OHV use in dispersed areas), the effects are not projected to be substantial. Designating OHV use as limited in certain areas (i.e., limited to existing roads and routes, possibly during specific times of year) would have the effect of creating a network of OHV routes rather than allowing open exploration in these areas. However, there would still be ample opportunities for adventure and exploration, and BLM recreation specialists expect that overall use would not change. On both BLM and Forest Service lands, agency recreation specialists predict the alternatives will not result in measurable impacts on recreation visitor days.

BLM Special Recreation Permits and Forest Service Special Use Permits that are in PPMAs and PGMAs could be modified in some alternatives. This could result in a loss of commercial revenue to recreation service providers, as well as loss of permit-generated fee revenue for the BLM and Forest Service as managing agencies. However, for several reasons, the BLM predicts that any losses would be relatively small. This is because the distance needed to avoid sensitive habitat is relatively small (usually four miles at most). The BLM and the permit holder would sometimes

be able to avoid impacts altogether by modifying the time of use; and there are relatively few activities that the BLM would permit in the first place that would have impacts on GRSG. Thus, although specific permit modifications are not prescribed at the level of this EIS and, it is not possible to quantify the economic impacts, any impacts are likely to be small.

For all of Alternatives B through F, the net economic effect on recreational activity is not possible to quantify, but would likely be very small. The primary effect on recreational activity would be related to change in designation from open to limited for OHV use, and as noted above (and in **Section 4.18**, Recreation), BLM recreation specialists expect that use overall would not change.

Alternative A—Under Alternative A, existing recreation opportunities in the study area would be maintained. Alternative A would not result in impacts on revenue of commercial recreation service providers or managing agencies attributable to BLM SRPs and Forest Service SUAs, as it would result in no changes to current management.

Alternative B—The restrictions on BLM SRPs and Forest Service SUAs documented in **Section 4.18**, Recreation, may result in modifications for some types of permitted uses (e.g., OHV races) on PPMAs, potentially resulting in fewer opportunities for this type of event. As noted above, the OHV area designation change on PPMAs (from open to limited) may result in small changes in patterns of OHV travel in the study area, but public lands recreation specialists do not anticipate any changes in recreational use. The economic effect from recreational activity is not possible to quantify, but if there is any difference versus Alternative A from restrictions on BLM SRPs and Forest Service SUAs, it is likely to be very small.

Alternative C—Economic impacts of Alternative C with respect to BLM SRPs and Forest Service SUAs are the same as Alternative A. There would be no anticipated change in economic impacts with respect to the OHV area designation change on PPMAs/PGMAs because public lands recreation specialists do not anticipate any changes in recreational use. Thus, economic impacts with respect to recreation would be the same as in Alternative A.

Alternative D—Under Alternative D, BLM SRPs and Forest Service SUAs could be restricted for some types of permitted uses (e.g., OHV races) on PPMAs and PGMAs, which may (but would not necessarily, for the reasons noted above) result in reduced economic activity associated with these events. There would be no anticipated change in economic impacts with respect to the OHV area designation change on PPMAs/PGMAs, because public lands recreation specialists do not anticipate any changes in recreational use. The economic effect from recreational activity is not possible to quantify, but if there is any difference versus Alternative A from restrictions on BLM SRPs and Forest Service recreation permits, it is likely to be very small.

Alternative E—Alternative E would result in the same economic impacts related to recreation as in Alternative A.

Alternative F—Alternative F would result in the same economic impacts related to recreation as in Alternatives B and D.

Other Values Associated with Recreation

As described in **Chapter 3**, only a portion of the value of recreation on public lands is captured in the marketplace. Here, the concept of consumer surplus is used to measure the “non-market” portion of recreation value. As noted in **Chapter 3** and **Appendix N**, these nonmarket values are not directly comparable to output, earnings, or jobs associated with various resource uses

on BLM-administered and Forest Service-administered lands, which are described elsewhere in this section.

As discussed above, recreation specialists believe the alternatives would not result in measurable changes in recreational activities or patterns. Therefore, there would be no change in non-market recreation values.

Impacts from Management of Oil and Gas Leases

Overall Employment, Earnings, Output, and Earnings per Job Impacted by Management Alternatives

The potential impacts of management alternatives affecting oil and gas drilling, completion, and production on overall employment, earnings, and output were estimated quantitatively using the IMPLAN model. BLM calculated these impacts from an estimate of the number of wells expected to be drilled and completed, and the amount of oil and gas produced, as well as per-well and per-barrel estimates of economic output, earnings, and employment. These estimates are documented in detail in **Appendix O**.

Based on the restrictions identified for the management alternatives, BLM oil and gas specialists projected that the number of wells and volume of production would be the same for Alternatives A, C, D, and E. In Alternatives B and F, management actions would restrict exploration and development activity such that no new wells would be drilled (BLM 2013f). As a result, no new wells would be completed, and no oil would be produced, on GRSG habitat. Existing wells, and wells not on GRSG habitat, would not be affected under any alternative.

For analytical purposes, to highlight the lower economic activity in Alternatives B and F, new wells were assumed to be drilled and completed over 20 years at a uniform rate, and the oil from completed wells was also assumed to be produced at a uniform rate over 20 years. Thus, the total economic activity associated with oil and gas development and production was estimated by summing economic activity from drilling, completion, and total oil production for each completed well, then dividing by 20 to produce an approximate annual figure for comparison with baseline data. The results are presented in **Table 4-30**, Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings Compared to Alternative A.

Table 4.31. Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings Compared to Alternative A

Item	Alternatives C, D, and E	Alternatives B and F
Output	No change	-\$86.9
Employment	No change	-175.0
Earnings	No change	-\$10.8

Source: Calculated using BLM (2013f) and the IMPLAN model, as explained in the text and in **Appendix O**, Economic Impact Analysis Methodology.

Note: Dollar figures are in millions of year-2010 dollars.

The results focus on new wells on new leases, rather than new wells on existing leases. However, it is conceivable that in Alternatives B and F, the number of new wells on existing leases could be lower than in Alternative A. This could happen if the NEPA review during the exploration stage (Application for Permit to Drill) identifies conflicts with GRSG habitat and the BLM Field Office thus requires protective measures beyond normal drilling review requirements. If the operator then determines that the increased requirements would make it economically not feasible

to continue the exploration process, and decides not to continue exploration activity, this could result in reduced drilling activity from new wells on existing leases (BLM 2013f). This would mean that the economic impacts of Alternatives B and F could be greater than those shown in **Table 4-30**, Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings Compared to Alternative A.

The economic impact of decreases in oil and gas development in the study area under Alternatives B and F would be principally felt in areas that are being explored for oil and where workers and service providers reside. Although most of the current production in the study area is in Nye County and Eureka County (see **Section 3.23**, Socioeconomics and Environmental Justice), the restrictions in Alternatives B and F on oil and gas exploration are not expected to result in any economic impacts on these counties. Instead, the BLM expects the economic impacts to occur primarily in Elko County, the most significant area for current exploration activity (BLM 2013f).

Impacts from Management of Locatable and Salable Minerals

As described in **Chapter 3**, the study area produces several salable and locatable minerals, including gold, silver, copper, and sand and gravel. GRSG habitat management alternatives would impose restrictions on development of mineral production, particularly under Alternatives B and F, which would close PPMAs to mineral material sales and require restoration of salable mineral pits no longer in use to meet GRSG conservation objectives (see **Section 4.14**, Minerals – Salable). Also, under Alternatives B and F some lands would be petitioned for withdrawal from locatable mineral entry (see **Section 4.13**, Minerals – Locatable).

Any entity that holds valid existing rights to locatable mineral development would not be affected by a withdrawal of lands from locatable mineral entry because the valid existing right would supersede a withdrawal if it occurs. **Section 4.13**, Minerals – Locatable, provides more information about valid existing rights; also, see the definition of valid existing rights in **Chapter 8**, Acronyms and Glossary. For areas without a valid existing right, if an area is withdrawn for locatable mineral entry, an applicant wishing to stake a claim would be required to pay for a mineral examination to determine if the claim is valid, based on geological potential and expected economic viability. The applicant would pay the cost of the mineral examination. This would hinder exploration or claim activity for some operators and some claims, depending on the size of the claim, expected return on investment, and the operator's ability to invest capital upfront in the process. However, because all of this information is site-specific, it is not possible to determine the specific economic impacts of the petition for withdrawal under Alternatives B and F.

BLM specialists generally expect that the production of gold, silver, and copper would remain the same across all alternatives (BLM 2013g), at least in the first three to five years after any withdrawal from locatable mineral entry is implemented. In the long run, production of locatable minerals would be affected only to the degree that the cost of conducting a mineral examination would affect individual operators' decisions to pursue claim, which would depend on site-specific and operator-specific conditions.

Closing PPMAs to mineral material sales in Alternatives B, D, and F would increase costs for commercial and public users of mineral materials. Because transportation of mineral materials is typically a cost driver, especially for municipal users, closing pits in PPMAs could have a measurable financial impact on entities that depend on sand and gravel from BLM-administered lands. The BLM would attempt to reduce this impact by identifying new pits proximate to identified needs, but at the stage of this analysis – without knowing the location, timing, and

amounts needed – it is not possible to determine the economic impacts on either municipal or commercial entities.

Overall, economic activity associated with management of locatable minerals would be the same for Alternatives A, C, D, and E, and may be lower under Alternatives B and F depending on site-specific and operator-specific conditions. Economic activity associated with salable mineral materials would be the same for Alternatives A, C, and E, and may be lower under Alternatives B, D, and F. The reductions are not possible to quantify for this EIS, but the BLM believes they would be small at least in the short run (three to five years after implementation).

Impacts from Management Actions Affecting Geothermal Exploration and Development

Economic impacts from geothermal exploration and development are a function of construction and operation expenditures for geothermal electricity development, including drilling wells, constructing power plants, and operating facilities. BLM developed a RFDS for geothermal development, which serves as a basis for analyzing impacts resulting from future leasing and development of federal geothermal resources within the decision area over the next 20 years. The RFDS analysis predicts that in Alternative A, approximately 25 power plants will come online over the next 20 years as a result of continued exploration and development activity. The RFDS analysis also notes that in the remaining alternatives, exploration and development activity would be restricted (to varying degrees) due to restrictions associated with GRSG habitat conservation.

For the purposes of the economic analysis, BLM assumed that about two-thirds of the new power plants would use traditional hydrothermal technology and the remaining plants would use Enhanced Geothermal Systems. BLM also assumed that the plants would come online on a roughly uniform schedule, so that half of the plants would be online halfway through the 20-year forecast period. Thus, the analysis of economic activity from plant construction reflects a typical year (i.e., for Alternative A, about 1.25 plants constructed) and the analysis of economic activity from plant operation reflects the midpoint year (ten new plants online).

To estimate economic activity associated with geothermal development, BLM first used the National Renewable Energy Laboratory's JEDI model to determine approximate capital and operating costs associated with a representative power plant, based on a 15 MW nameplate capacity and typical conditions for the planning area. BLM then used IMPLAN, calibrated to the specific region of the socioeconomic study area, to calculate the total (i.e., direct, indirect and induced) impacts associated with a given direct expenditure. **Table 4-31**, Economic Impact of Management Actions Affecting Geothermal Exploration and Development Compared to Alternative A, presents the resulting estimates of output, employment, and earnings estimates for activities related to geothermal development for Alternatives B, C, D, E and F, compared with Alternative A.

Table 4.32. Economic Impact of Management Actions Affecting Geothermal Exploration and Development Compared to Alternative A

	Alt B – Alt A	Alt C – Alt A	Alt D – Alt A	Alt E – Alt A	Alt F – Alt A
<i>Construction (representative for one year)</i>					
Output	-\$25.8	-\$36.8	-\$22.1	\$0.0	-\$36.8
Employment	-166	-237	-142	0	-237
Earnings	-\$9.8	-\$14.0	-\$8.4	\$0.0	-\$14.0
<i>Operations (for year 10 of planning period)</i>					
Output	-\$8.6	-\$12.3	-\$7.4	\$0.0	-\$12.3

	Alt B – Alt A	Alt C – Alt A	Alt D – Alt A	Alt E – Alt A	Alt F – Alt A
Employment	-70	-99	-60	0	-99
Earnings	-\$6.6	-\$9.4	-\$5.6	\$0.0	-\$9.4

Source: Calculated using the IMPLAN model as explained in the text and in **Appendix O**, Economic Impact Analysis Methodology.

Notes: Output and earnings are in millions of year 2010 dollars. Average earnings per job are in 2010 dollars. The economic impact for operations in year 10 of the planning period represents the point at which half of the expected geothermal power plants have been developed and are operating.

Alternative A—Under Alternative A, BLM predicts geothermal exploration and development activity would proceed according to the Geothermal RFDS scenario. This entails 243 new exploratory and development wells would be drilled, of which 152 are expected to be production wells, 76 would be injection wells, and 15 would be exploratory wells that would not be converted into either production or injection wells. As a result of these successful wells, 25 power plants would come online (BLM 2013h).

Alternative B—Under Alternative B, lands with high geothermal potential that overlap PPMAs would be closed to geothermal leasing, exploration and development. It is uncertain which future geothermal projects would be located within these lands; however, it is estimated that geothermal exploration and development could be reduced by 20 to 50 percent (BLM 2013h). BLM used the midpoint of this range to estimate expected reductions in output, employment, and earnings compared to Alternative A.

Alternative C—Under Alternative C, closure of public lands to fluid mineral leasing would restrict the amount of new geothermal leasing exploration and development that would otherwise occur. It is estimated that geothermal exploration and development would be reduced by 30 to 70 percent (BLM 2013h). The BLM used the midpoint of this range to estimate expected reductions in output, employment, and earnings compared to Alternative A.

Alternative D—Under Alternative D, NSO restrictions would reduce the availability of PPMAs and PGMAAs to geothermal exploration and development. As a result, it is estimated that geothermal exploration and development could be reduced by approximately 20 to 40 percent (BLM 2013h). BLM used the midpoint of this range to estimate expected reductions in output, employment, and earnings compared to Alternative A.

Alternative E—Under Alternative E, it is estimated that drilling and exploration would be close to that in Alternative A (BLM 2013h). Thus, BLM predicts there would be no reduction in output, employment or earnings compared to Alternative A.

Alternative F—Constraints on geothermal leasing, exploration and development in this alternative would be similar to those in Alternative C (BLM 2013h). Thus, the BLM estimated that reductions in output, employment, and earnings would be identical to those of Alternative C.

Geographically, the impacts associated with reduced geothermal exploration and development would most likely be felt in Churchill, Humboldt, Lander, and Washoe Counties, since that is where most geothermal electrical generation is occurring on federal lands today (see **Chapter 3**).

Impacts from Management Actions Affecting Wind Energy Development

As described in **Chapter 3**, Affected Environment, some wind projects have either been proposed or are in the monitoring stage in the study area. Currently existing or proposed wind energy ROWs in the study area include approximately 150 MW of installed capacity. BLM's current

projections for wind energy in the study area are for the installation of approximately 1,556 MW of installed capacity in the reasonably foreseeable future. Under Alternative A, the expectation would be maintained. Although specific impacts have not been quantified at this time, BLM anticipates that Alternatives B through F may restrict approval of several of the projects (BLM, 2013i), resulting in lower annual output, employment, and earnings relative to Alternative A.

Alternative A—Under Alternative A, BLM predicts that the installation of approximately 1,556 MW of installed capacity in the reasonably foreseeable future would be maintained (BLM 2013j).

Alternatives B and C—Impacts on wind energy development are expected to be greatest under Alternatives B and C because these alternatives would place the most restrictions on development by designating habitat as exclusion areas. BLM is unable to quantify the impacts of these restrictions at this time. However, BLM anticipates that the restrictions on development under Alternatives B and C would cause the greatest expected reductions in output, employment, and earnings compared to Alternative A.

Alternatives D, E, and F—Management under Alternatives D, E, and F would place restrictions on the development of wind energy to a greater extent than under Alternative A, but to a lesser extent than under Alternatives B and C. BLM is unable to quantify the impacts of these restrictions at this time. Note that restrictions in Alternative E would affect Nevada only.

Impacts from Management Actions Affecting Land and Realty and Travel Management

Direct Economic Activity Dependent on BLM-administered and Forest Service-administered Land and Resource Management

Management actions that affect development of infrastructure could have important hindering effects on the growth of economic activity in the area. Limitations on new ROWs for power lines, pipelines, and access routes or restrictions to route construction and to travel on existing roads could increase the cost of new economic investments or make them no longer economically viable. Additional information about changes in cost effectiveness and efficiency associated with restrictions on ROW, corridors, and treatments are discussed in **Section 4.15**, Lands and Realty and **Section 4.7**, Vegetation and Soils. A qualitative discussion of the potential for economic impacts from restrictions to land use and transportation is provided below for each alternative.

Alternative A—Alternative A would place the fewest restrictions on ROW development and route construction and maintain the largest area open to travel, among the alternatives.

Alternative B—Management actions under Alternative B to protect GRSG habitat would impact lands and realty through the closure of areas to ROW and special use authorizations, additional criteria for land exchanges, and limitations on new mineral development and road construction. Motorized travel would be limited to existing routes in PPMAs unless BLM or Forest Service has completed travel management plans which designate specific roads (routes) for motorized travel. Routes constructed in excess of a 3 percent disturbance cap would face increased costs with mitigation resulting from the loss of habitat. Alternative B would impose limitations and added costs to future economic investments in the study area compared with Alternative A.

Alternative C—Under Alternative C, impacts on ROW authorizations would be similar to Alternative B, but would apply to a larger land area and there would be no designated corridors to accommodate new ROW infrastructure. Additionally, travel management under Alternative C would have similar impacts as Alternative B, with added restrictions: route construction would

require a 4-mile buffer from leks in PPMAs and PGMAs. Alternative C would impose the most limitations and added costs to future economic investments in the study area.

Alternative D—ROW development and SUAs under Alternative D would also face restrictions, but these would be more limited than under Alternatives B and C. Restriction and costs to infrastructure development under Alternative D would be greater than under Alternative A but less than under Alternatives B or C.

Alternative E—Management under Alternative E would have similar impacts as Alternative A, and less than under Alternatives B, C, and D.

Alternative F—Impacts from Alternative F are the same as or similar to those under Alternative D, except that Alternative F would further restrict the construction of new routes by not allowing new routes within a 4-mile buffer from leks.

Impacts from Management Actions Affecting Special Status Species

Other Values Associated with Populations of GRSG

As described in **Chapter 3**, economists and policy makers have long recognized that rare, threatened, and endangered species have economic values beyond those associated with active “use” through viewing or hunting. **Chapter 3** and **Appendix N** document current methods to estimate these “non-use” values, including a description of the literature review that the BLM and Forest Service conducted to determine if there were existing non-use value studies for GRSG. Although there are no existing studies on valuation specific to the GRSG, several studies published in peer-reviewed scientific journals for bird species with similar characteristics find average stated willingness-to-pay between \$15 and \$58 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix N** for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share since the studies primarily address species that are not hunted.

Since GRSG protection is a public good available to all households throughout the intermountain west, if similar per-household values apply and if even a small portion of the per-household value represents a non-use value, then the aggregate regional non-use value could be substantial. However, the BLM and Forest Service did not quantify the aggregate value because of several factors, including uncertainty associated with the comparability of the existing studies to the GRSG context and the documented difference between stated and actual willingness-to-pay.

From a qualitative perspective, however, the non-use values associated with populations of GRSG would be expected to correspond to the degree of habitat protection associated with each alternative. Current management, Alternative A, provides the least amount of protection for GRSG in the planning area and consequently could result in the most impacts on GRSG. As a result, to the degree that there are non-use values associated with populations of GRSG, management under Alternative A would have the greatest adverse impacts on those values.

As discussed in **Section 4.6**, Special Status Species, most of the management actions under the alternatives would be beneficial for GRSG. It is therefore estimated that, compared with Alternative A, each alternative would have a positive impact on non-use values associated with populations of GRSG. However, because so many factors (e.g., vegetation and soils management, livestock grazing management, fire and fuels management, and wild horse and

burro management) impact the protectiveness of each alternative, it is difficult to anticipate the comparative protection, and therefore non-use values, provided by Alternatives B through F.

Impacts on Tax Revenues and Payments to States and Counties

Reductions in economic activity have the potential to result in reduced tax revenues for local and state governments as well as the federal government. At the state level, these could take the form of reductions in mineral severance taxes or oil and gas production taxes, sales and use taxes, or (in California only) personal and corporate income taxes. At the local level, revenues could be reduced if property or sales taxes decrease.

The alternatives are unlikely to have a significant impact on state tax revenues. As described in **Section 3.23**, Socioeconomics and Environmental Justice, most Nevada state revenues come from sales and use taxes, the Modified Business Tax, and minerals taxes (predominantly on gold and silver production). Nevada's overall economic output, which provides a measure of its sales tax base, was over \$124 billion in 2010, and the reductions in output anticipated due to the most restrictive alternative (Alternative F) would result in a reduction of at most \$224 million, amounting to less than 0.2 percent of total output. Furthermore, some of these reductions in output would occur in California, which had a 2010 gross state product of over \$1.8 trillion (BEA 2013). In both states, the stability of other sources of economic activity and resulting revenue – including but not limited to severance taxes from gold, silver and copper production in Nevada, and corporate and individual income taxes from a wide variety of industries in California – would avert significant impacts on state government revenues. As noted in the analysis of economic impacts from locatable mineral production, BLM specialists generally expect that the production of gold, silver, and copper would remain the same across all alternatives (BLM 2013g), at least in the first three to five years after any withdrawal from locatable mineral entry is implemented. In the long run, production of locatable minerals would be affected to the degree that the cost of conducting a mineral examination would affect individual operators' decisions to pursue claim, which would depend on site-specific and operator-specific conditions. If operators' decisions are constrained, this could have a corresponding impact on state and local tax revenues.

Local government tax revenues may however, be substantially affected in specific areas that would experience dramatic reductions in economic activity. Although specific impacts on local government tax revenues could not be quantified, the anticipated reductions in economic activity suggest that certain regions could be most affected by reductions in local tax revenues:

- In Alternatives C and F: Modoc County, California, and the Nevada counties of Pershing and Nye (because of reduced livestock grazing)
- In Alternatives B, C, D, and F: Churchill, Humboldt, Lander, and Washoe Counties in Nevada (because of reduced geothermal exploration and development)
- In Alternatives B and F: Elko County (because of reduced oil and gas exploration and production)

Summary of Economic Impacts

Table 4-32, Average Annual Impact on Output, Employment, and Earnings Compared to Alternative A, provides a summary of potential effects of management alternatives on employment, earnings, and employment in the study area. Alternative A represents impacts associated with current management. The differences shown in the table are derived from

summing the estimated reductions for each alternative related to livestock grazing (using the midpoint of the low and high scenarios in **Table 4-29** Annual Impact of Management Actions Affecting Livestock AUMs on Output, Employment, and Earnings Compared to Alternative A, as well as data from **Table 4-30**, Average Annual Impact of Management Actions Affecting Oil and Gas on Output, Employment, and Earnings Compared to Alternative A, and **Table 4-31** Economic Impact of Management Actions Affecting Geothermal Exploration and Development Compared to Alternative A. Although the quantitative analysis includes only earnings and employment affected by management impacts on grazing, oil and gas, and geothermal exploration and development, these activities capture the substantial majority of the economic impact of the alternatives.

Table 4.33. Average Annual Impact on Output, Employment, and Earnings Compared to Alternative A

	Alt B – Alt A	Alt C – Alt A	Alt D – Alt A	Alt E – Alt A	Alt F – Alt A
<i>Values</i>					
Output	-\$121.3	-\$185.2	-\$29.5	\$0.0	-\$202.3
Employment	-411	-1,825	-202	0	-1,237
Earnings	-\$27.2	-\$73.1	-\$14.0	\$0.0	-\$58.4
<i>Percentage of 2010 baseline values</i>					
Employment	-0.11%	-0.51%	-0.06%	0.00%	-0.34%
Earnings	-0.16%	-0.44%	-0.08%	0.00%	-0.35%
Source: Impacts are calculated using the IMPLAN model, as explained in the text and in Appendix O . Percent of 2010 baseline is calculated from value of impacts and baseline information provided in Section 3.23 , Socioeconomics and Environmental Justice.					
Note: Output and earnings values are in millions of year 2010 dollars.					

The analysis shows that the reductions in economic output, employment and earnings would be greatest under Alternatives C and F, and there would also be reductions in Alternatives B and D. The reductions in Alternative C would correspond to approximately 0.5 percent of total 2010 employment, and 0.4 percent of total earnings, in the study area. Reductions in Alternative F would correspond to approximately 0.3 percent each of 2010 employment and 2010 earnings in the study area. Corresponding percentages could not be calculated for output, since baseline output could not be calculated for the counties of the study area (it is available only at the state level).

In Alternative B, the reductions are due partly to anticipated reductions in oil exploration and development (about 40 percent of earnings and employment) and partly to geothermal exploration and development (about 60 percent), and therefore would occur primarily in Elko, Churchill, Humboldt, Lander, and Washoe Counties in Nevada.

In Alternative C, two-thirds or more of the reductions would be due to reductions in livestock grazing (68 percent of earnings, 73 percent of output and 82 percent of employment reductions); thus, the impacts would occur primarily in Modoc County, California, and the Nevada counties of Pershing and Nye, with additional impacts – due to reduced geothermal development – in Churchill, Humboldt, Lander, and Washoe Counties in Nevada.

In Alternative D, the reductions are entirely due to anticipated reductions in geothermal exploration and development, and therefore would occur primarily in Churchill, Humboldt, Lander, and Washoe Counties in Nevada.

In Alternative F, a portion of the reductions would be due to lower oil development (19 percent of earnings, 43 percent of output, and 14 percent of employment), which would primarily affect Elko County, Nevada. Reductions would also occur in livestock grazing (41 percent of earnings,

33 percent of output, and 59 percent of employment reductions), which would occur primarily in Modoc County, California, and the Nevada counties of Pershing and Nye. Reductions in geothermal development, accounting for 40 percent of earnings, 24 percent of output, and 27 percent of employment, would probably affect primarily Churchill, Humboldt, Lander, and Washoe Counties in Nevada.

Some differences among the alternatives could not be quantified. Among these are state and local tax revenues; however, tax revenues are largely tied to economic output and earnings, so the relative magnitude of impacts on local and state governments can be observed based on the information presented above.

4.19.3. Social Impacts

Impacts from Management Actions Affecting Migration

Population

The decrease in employment opportunities in the study area that would accompany Alternatives B, C, D, and F may impact the capacity of the study area to attract and retain its labor force, with possible consequences for population growth. Specific counties and communities most likely affected would be those linked to employment reductions, which vary by alternative but are discussed immediately above. The counties that would likely experience most of the reductions are:

- In Alternatives C and F: Modoc County, California, and the Nevada counties of Pershing and Nye (because of reduced livestock grazing)
- In Alternatives B, C, D, and F: Churchill, Humboldt, Lander, and Washoe Counties in Nevada (because of reduced geothermal exploration and development)
- In Alternatives B and F: Elko County (because of reduced oil and gas production)

As shown in **Chapter 3**, all of these counties experienced substantial population growth over the period 1990-2010, except Lander County, Nevada, which saw a decrease of about 8 percent, and Modoc County, California, whose population stayed essentially constant. All of the counties experienced somewhat more measured growth over the period 2000-2010, except Lander and Modoc (which stayed about the same) and Nye and Washoe (which saw substantial increases). Given this fact and the relatively small projected changes in employment in Alternatives B and D, population impacts would not be substantial in these alternatives. However, population impacts could be measurable in Alternatives C and F, especially for the counties that are most affected by reductions in livestock grazing.

Housing and Public Services

Housing demand would not be affected in a substantial way by any of the alternatives. Reductions in employment opportunities could affect population, but under no alternatives would population be increased, meaning that the alternatives would not affect housing demand in a way that could be adverse for most populations in the area.

Demand for public service also would not increase, for the same reason. However, the abilities of counties to supply public services could be reduced in Alternatives C and F, in accordance with

potential reductions in local tax revenues. State tax revenues would not be affected substantially, as documented in the section on fiscal conditions.

Impacts from Management Actions Affecting Specific Groups and Communities

Consistency with County Land Use Plans

The decision under consideration may result in amended BLM and Forest Service management and LUPs throughout Nevada and Northeast California. The BLM and Forest Service management and LUPs must be consistent with state and local LUPs to the extent possible, and any amendments to be made would aim to maintain this consistency. This would be the case under all alternatives.

Interest Groups and Communities of Place

As described in **Chapter 3**, there is a range of interest groups in the study area with overlapping and divergent interests. Groups centered on recreation interests, grazing, mining, land development, infrastructure development, business development, and conservation of natural resources would be impacted differently by the management alternatives. Within these interest groups, there are more specific ones that could be particularly affected. Among the interest groups most likely to be affected by the choice of alternative are those associated with livestock grazing, geothermal resource exploration and development, oil exploration, and wildlife conservation.

Specific communities will also not be impacted in the same way by the management alternatives. Communities with more diversified economies, and particularly those less dependent on grazing, will likely be less impacted than those that do depend heavily on grazing. Although economic impacts would also occur for oil development and geothermal interests, the reductions in grazing availability proposed in Alternatives C and F would likely have a more substantial impact on the ranching industry than reductions in oil and geothermal exploration would have on the oil and geothermal industries. BLM- and Forest Service-administered lands and federal grazing permits are relatively important for maintaining the economic viability of grazing, and reducing or eliminating grazing on GRSG habitat could have adverse effects on quite a few ranch operators. Comparatively, the proposed restrictions on oil and geothermal development would affect several operators but would not have a substantial adverse effect on oil or geothermal development generally in the counties that make up the study area. In addition, oil and gas developers could move to private or state land – potentially even tapping the same federal resources using directional drilling – and still be profitable.

The BLM and Forest Service reviewed the scoping report to identify any comments related to specific communities that may be particularly affected by various management alternatives. Two scoping comments identified the agricultural sector in Lassen County, CA, as making a significant contribution to the county's economy; county-level data on employment and earnings (see **Appendix M**) shows that this is indeed the case, although crops provide two-thirds of farm receipts, and changes to livestock grazing and ranching would likely have relatively small effects on the county's economy (see **Table 3-78** of **Section 3.23**, Socioeconomics and Environmental Justice).

Several commenters expressed concern that employment, fiscal contributions, and other beneficial economic effects of mining – including communities surrounding mining operations – could be negatively impacted by the choice of management alternative. However, the BLM's analysis shows that production of locatable minerals would be unaffected by the choice of alternatives at

least in the short run. In the long run, production of locatable minerals would be affected only to the degree that the cost of conducting a mineral examination would affect individual operators' decisions to pursue claim, which would depend on site-specific and operator-specific conditions. Closing PPMAs to mineral material sales in Alternatives B, D, and F would increase costs for commercial and public users of mineral materials, but as discussed above, without knowing the location, timing, and amounts needed, it is not possible to determine the economic impacts on either municipal or commercial entities.

One scoping comment identified Eureka County, NV as a particularly vulnerable area, explaining that eighty-one percent of Eureka County's land area is made up of federally administered land. However, no particular impacts were identified that would affect the economic or social conditions in this county. This is supported especially by the fact that nearly 80 percent of employment and over 90 percent of earnings in Eureka County are due to mining, including oil and gas (see **Appendix M**). As noted earlier, the BLM does not expect mineral production to differ among the alternatives at least in the first three to five years following implementation; longer term impacts are uncertain, and depend on site-specific and operator-specific characteristics.

During cooperating agency review of this LUPA/EIS, Nye County, Nevada, commented that 98 percent of the county's land area is federally administered. The county also expressed concern about certain impacts identified in the administrative draft LUPA/EIS, and the BLM and Forest Service modified portions of the analysis in order to ensure that impacts on Nye County (and other counties in the study area) are characterized as specifically as possible given the information available.

Summary of Social Impacts

Management under Alternatives B, C, D, and F – and especially Alternatives C and F – could have the effect of limiting the attraction and retention of population in the study area. These impacts would not be homogeneous throughout the study area, but would be concentrated in specific communities where GRS habitat intersects with resources important to employment opportunities.

Communities with strong interest groups focused on livestock grazing or oil and geothermal development would likely experience adverse impacts from Alternatives B, C, D, and F, but especially Alternatives C and F.

4.19.4. Environmental Justice Impacts

The BLM and Forest Service considered information on the presence of minority and low-income populations (from **Chapter 3**) along with additional information, described in this section, to assess the potential for the alternatives to result in disproportionately high and adverse impacts on minority or low-income populations. Although conservation measures would be implemented consistently across all identified habitat, with no discrimination over particular populations, environmental justice guidance requires agencies to consider also whether their actions could unintentionally result in disproportionately high and adverse effects.

To help guide the analysis of potential environmental justice impacts, the BLM and Forest Service considered the information gathered in the Economic Strategies Workshop that was conducted in June 2012. That workshop was convened to identify public concerns related to potential social, economic and environmental justice impacts that could result from the management alternatives.

None of the public comments received during that workshop called out a specific concern related to minority populations (BLM 2012g).

The BLM and Forest Service also reviewed the scoping report for the present EIS to identify any comments related to environmental justice issues. The only scoping comments identified that related to minority or low-income populations were several comments pertaining to the cultural significance of the GRSG to Native American tribes, with one commenter specifically calling out the Yomba Shoshone.

Potential Impacts on Minority Populations

As discussed in **Chapter 3**, CEQ guidance identifies a community or a specific population group as a minority population when either: (1) minorities in the affected area exceed 50 percent of the total population; or (2) the percentage of minorities in the affected area is meaningfully greater than the percentage in the general population or appropriate unit of geographical analysis. Based on the description of minority presence in the study area in **Chapter 3**, and based on definitions in relevant guidance, no minority populations were identified in the study area. Smaller communities where minority presence is “meaningfully greater” than in the state as a whole, although not identified in **Chapter 3**, may also exist in the study area, given its large geographic coverage.

The extent to which existing minority populations are disproportionately impacted by high and adverse human health or environmental effects depends on the existence of high and adverse human health or environmental effects from management alternatives on any of the resources analyzed, and whether minority populations are particularly vulnerable to these impacts or more likely to be exposed to such impacts. Adverse impacts of alternatives were identified under the various resources analyzed and are described in their respective sections of **Chapter 4**.

One issue of potential concern relates to interests of Native American tribes. BLM’s consultation and outreach efforts to Native American tribes resulted in a number of concerns expressed by tribal leaders and members: see **Section 3.18**, Tribal Interests (including Native American Religious Concerns). Most of these concerns relate to viability of GRSG populations, although at least one tribe, the Summit Lake Tribe, expressed concern that habitat conservation in some alternatives could negatively impact road realignment projects near their reservation and plans to expand their reservation boundaries because their reservation is surrounded by priority habitat. **Section 4.21**, Tribal Interests, describes these and other tribal concerns in detail, and also addresses how the alternatives would affect tribal interests. That section notes that the future status of the Summit Lake Tribe road realignment and reservation boundary expansion projects as they relate to GRSG planning efforts is unknown.

In addition, several tribes (the Pyramid Lake Paiute Tribe, Fort McDermitt Tribe, and Yomba Shoshone Tribe) hold grazing permits on either BLM or Forest Service lands. In all three cases, the allotments could be affected by GRSG management actions (i.e., they have no tribal treaty rights associated with the grazing permit or the allotment they use). Although this may affect the tribes’ ability to manage livestock, from an environmental justice perspective it does not represent a disproportionate impact since the tribes would not be singled out or disproportionately affected. Rather, they would experience the same adverse effects as other users of federal grazing allotments, which could include the loss of part or all of their allotment in Alternatives C and F.

BLM and Forest Service also considered the possibility that the employment losses, especially those anticipated in Alternatives C and F, could disproportionately affect minority populations. If employment losses – such as the estimated reduction of 1,825 jobs in Alternative C relative to

Alternative A – were to affect minority populations disproportionately, this could be considered a disproportionately high and adverse impact on minority populations. However, these job losses would occur over a relatively broad geographic area, and over a number of different economic sectors (keeping in mind that the employment losses include related industries, not just the industries directly affected), including mining, agriculture, construction, manufacturing, wholesale trade, retail trade, and others. Given the sectoral and geographic dispersion of the impacts, and the fact that employment in these industries is not overly concentrated within any particular racial or ethnic group, the BLM and Forest Service find no evidence to support the idea that these job losses would affect minority populations disproportionately.

Thus, based on available information about the nature and geographic incidence of impacts, neither specific minority populations nor tribal populations would be exposed to disproportionately high and adverse impacts under any of the management alternatives considered.

Potential Impacts on Low-Income Populations

Virtually all of the counties in the study area have a concentration of low income populations that exceeds the state average, as discussed in **Chapter 3**, including both Lassen and Modoc Counties in California and seven of the ten Nevada counties (Eureka, Humboldt, Lander, Nye, Pershing, Washoe, and White Pine). It is also possible that there are smaller communities in the remaining counties (Churchill, Elko, and Lincoln) that constitute low-income populations, given the large geographic spread of each county.

The extent to which low-income populations are disproportionately impacted by high and adverse human health or environmental effects depends on the existence of high and adverse human health or environmental effects from management alternatives on any of the resources analyzed, and whether low-income populations are specifically vulnerable to these impacts or more likely to be exposed to such impacts.

Accordingly, similar to the analysis for minority populations, the BLM and Forest Service reviewed the impacts of alternatives described in the respective sections of **Chapter 4**. Based on available information about the nature and geographic incidence of impacts, the BLM and Forest Service identified a potential concern about disproportionately high and adverse impacts on low-income populations in Modoc County in California, and Nye County in Nevada, related to economic and social effects. This is based on relatively high poverty rates (18.4 percent for Modoc County and 18.9 percent for Nye County) and the identification of these counties as experiencing potentially substantial reductions in employment or earnings associated with livestock grazing in Alternatives C and F. Poverty rates in several other Nevada counties are as high (Eureka at 16.2, and White Pine at 15.5 percent), but these counties are not identified as having substantial effects due to anticipated reductions in employment from oil, geothermal or grazing in any of the alternatives.

As reported in **Chapter 3**, Modoc County experienced essentially flat population from 1990 to 2010. Modoc County also had the second-highest proportion of residents over the age of 65 (19.7 percent), which may indicate a relatively high number of residents who survive on a fixed income. This could help to mitigate some adverse impacts related to public lands management, as retired citizens are more likely to have income from Social Security, pensions and retirement accounts, which would not be tied to local economic activity.

Farm operations contribute 12.7 percent of employment and 22.1 percent of earnings (making it among the largest sectors overall, and the largest primary productive sector). About one-third of

cash receipts are from grazing and ranching; if grazing and ranching also generates about one-third of the overall agricultural employment and earnings, then any substantial reduction in grazing would have a measurable impact on economic activity in the county. The Modoc County LUP notes the importance of public land grazing allotments to economic viability of ranches, stating that federal and state lands occupy over three quarters of the county and that the economy of the county depends on commercial and business activities operated on those lands, including grazing.

Nye County experienced a large increase in population from 1990 to 2010 (147 percent, larger than any other county in the study area). Nye County had the highest proportion of residents over the age of 65 (23.4 percent), which may indicate a relatively high number of residents who survive on a fixed income, although, as in Modoc County, this could be a mitigating factor since retired citizens are more likely to have income from Social Security, pensions and retirement accounts, which would not be tied to local economic activity. Unemployment was higher in Nye County in 2008, 2009, 2010, and 2011 than in any other county in the study area, with the 2011 rate at 16.5 percent (**Table 3-75**, Annual Unemployment, 2007-2011, in **Section 3.23**, Socioeconomics and Environmental Justice). Farm operations contribute just 2.1 percent of employment and 3.1 percent of earnings, which represents a smaller contribution than mining, construction, retail trade, local government, professional and technical services, or several other sectors; however, nearly all of the farm-related receipts (95 percent) are from grazing and ranching, so that any substantial reduction in grazing would have an important impact on economic activity in the county.

With these considerations in mind, the BLM and Forest Service believe that Alternatives C and F could result in disproportionately high and adverse impacts on low-income populations in Modoc County and Nye County, especially, and also possibly in Lassen County. Based on available evidence, there would not be disproportionately high and adverse impacts on other communities, nor would there be disproportionately high and adverse impacts associated with Alternatives A, B, D, or E.

Table 4-33, Environmental Justice Impacts, provides a summary of the findings of this analysis with respect to disproportionately high and adverse effects of the alternatives

Table 4.34. Environmental Justice Impacts

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F
Disproportionately high and adverse impacts on minority populations	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Disproportionately high and adverse impacts on low-income populations	No Impact	No Impact	Disproportionately high and adverse impact related to employment/earnings from ranching and grazing (Modoc County)	No Impact	No Impact	Disproportionately high and adverse impact related to employment/earnings from ranching and grazing (Modoc County)

4.20. Unavoidable Adverse Impacts

Section 102(c) of NEPA requires disclosure of any adverse environmental impacts that could not be avoided should the proposal be implemented. Unavoidable adverse impacts are those that remain following the implementation of mitigation measures or impacts for which there are no mitigation measures. Some unavoidable adverse impacts occur as a result of implementing the LUPA. Others are a result of public use of BLM-administered and Forest Service-administered lands within the planning area. This section summarizes major unavoidable impacts discussions of the impacts of each management action (in the discussion of alternatives) and provides greater information on specific unavoidable impacts.

Planned activities would produce some level of air emissions, even with mitigation. However, none of the activities proposed in this LUPA/EIS would produce adverse impacts on the air quality resource, based on the definitions above.

Surface-disturbing activities would result in unavoidable adverse impacts. Although these impacts would be mitigated to the extent possible, unavoidable damage would be inevitable.

Permanent conversion of areas to other uses, such as transportation and mineral and energy development or OHV use, would be unlikely under all of the action alternatives. These would most likely decrease erosion and increase the relative abundance of species within plant communities, the relative distribution of plant communities, and the relative occurrence of seral stages of those communities. These activities would also intrude on the visual landscape. This type of development is most likely to occur under Alternative A. The other action alternatives place many restrictions on many types of development, which would most likely result in fewer visual intrusions and fewer instances of unavoidable wildlife habitat loss.

Unavoidable damage to cultural resources from permitted activities could occur if resources undetected during surveys were identified during surface-disturbing activities. In these instances, further activity would cease on discovery of a cultural resource, and mitigation measures would be implemented to minimize damage or loss. This scenario is most likely to occur under Alternative A since it would place the fewest restrictions on surface disturbing activities. Unavoidable loss of cultural resources would also occur, due to nonrecognition, lack of information and documentation, erosion, casual collection, and inadvertent destruction or use. Broad-scale sampling and classification of areas with a high likelihood of containing cultural and resources would be expected to greatly reduce the probability of unavoidable adverse impacts on the resource.

Wildlife, livestock, and wild horses as well as other herbivores consume vegetation and impact soils through hoof action and possible compaction. When these impacts are kept at appropriate levels natural processes such as plant growth and recovery, freeze-thaw periods and microbial activity in the soil surface result in recovery from these impacts and maintain site stability and health. Vegetative treatments promoting recovery of GRSR would result in the destruction of the target species, be it annual grass, noxious weed, encroachment of juniper or changes in the age classes of a sagebrush stand. Some level of competition for forage between these species, although mitigated to the extent possible, would be unavoidable. Instances of displacement, harassment, and injury could also occur. These types of scenarios are most likely to occur under Alternative A. The other action alternatives would place restrictions on many development and surface-disturbing activities, which would make the likelihood that displacement, harassment, and injury would occur to be much lower than Alternative A.

Recreation, development of mineral resources, and general use of the decision area would introduce additional ignition sources into the planning area, which would increase the probability of wildland fire and the need for its suppression. These activities, combined with continued fire suppression, would also affect the overall composition and structure of vegetation communities; this could increase the potential for high-intensity wildland fires. Restrictions on development under all of the action alternatives would be expected to decrease the potential for ignitions in the decision area.

As recreation demand increases, recreation use would disperse, creating unavoidable conflicts between recreation users, such as those seeking more primitive types of recreation, and motorized users sharing recreation areas. In areas where development would be greater, the potential for displaced users would increase. Under all of the action alternatives, restrictions on development would be expected to reduce the potential for displaced recreational users.

Numerous land use restrictions imposed throughout the decision area to protect GRSG habitat and other important values, by their nature, affect the ability of operators, individuals, and groups who use the public lands to do so without limitations. Although attempts would be made to minimize these impacts, unavoidable adverse impacts in the number and miles of roads or trails available for recreational use could occur under all of the action alternatives. Minimization would include limiting them to the level of protection necessary to accomplish management objectives and providing alternative use areas for affected activities.

4.21. Irreversible and Irretrievable Commitment of Resources

Section 102(2)(c) of NEPA requires a discussion of any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented. An irretrievable commitment of a resource is one in which the resource or its use is lost for a period of time (e.g., extraction of any locatable mineral ore or oil and gas). An irreversible commitment of a resource is one that cannot be reversed (e.g., the extinction of a species or loss of a cultural resource site without proper documentation).

Implementation of the LUPA management actions for all alternatives, except Alternative A, would result in fewer surface-disturbing activities, mineral and energy development, and ROW development that results in loss of irreversible or irretrievable resources.

Although new soil can develop, it is a slow process. Soil erosion or the loss of productivity and soil structure might be considered irreversible commitments to resources. Surface-disturbing activities, therefore, would remove vegetation and accelerate erosion, which would contribute to irreversible soil loss. However, many of the management actions in the LUPA are intended to reduce the magnitude of these impacts and to restore some of the soil and vegetation lost. Such disturbances would occur to the greatest degree under Alternative A, which would allow many more surface-disturbing activities, compared to the action alternatives.

Laws protecting cultural resources would mitigate irreversible and irretrievable impacts on cultural resources from permitted activity. BLM OHV use areas open to cross-country use could have some resources destroyed. This would be especially true in areas of high cultural sensitivity. Such destruction would be irreversible and irretrievable. Alternative A would have the greatest potential for a loss of cultural resource information.

Development of mineral resources (e.g., oil, gas, coal, sand, and gravel) is irreversible. If these nonrenewable resources were extracted for consumption or use, they would be irreversibly removed. BLM Handbook H-1624-1, Planning for Fluid Minerals (BLM 1990a), acknowledges leasing of oil and gas resources as an irreversible commitment. As noted above, this would be most likely under Alternative A.

4.22. Relationship Between Local Short-term Uses and Long-term Productivity

Section 102(c) of NEPA requires discussion of the relationship between local, short-term uses of human environment and the maintenance and enhancement of long-term productivity of resources. As described in the introduction to this chapter, short-term is defined as anticipated to occur within the first 5 years of implementation of the activity; long term is defined as following the first 5 years of implementation but within the life of the LUPA.

Short-term use of the air quality resource would not affect long-term productivity, except that air quality emissions in high enough concentrations could reduce vegetation and plant vigor. However, these types of impacts are not expected for any of the action alternatives since they would restrict development. Additionally, management actions would result in various short-term impacts, such as increased localized soil erosion, fugitive dust emission, and vegetation loss or damage and decreased visual resource quality. These impacts would be expected only under Alternative A, which it would allow the most surface-disturbing activities.

Other surface-disturbing activities, including transportation and utility corridor construction, and mineral resource development would result in the greatest potential for impacts on long-term productivity. Management prescriptions and RDFs are intended to minimize the effect of short-term commitments and to reverse change over the long term. These prescriptions and the associated reduction of impacts would be greatest under Alternative C, with Alternative B close behind for such resources as vegetation and wildlife habitat. However, some impacts on long-term productivity might occur, despite the prescriptions intended to reduce impacts on GRSG habitat.

ROWs/SUAs and short-term use of an area to foster energy and minerals would result in long-term loss of soil productivity and vegetation diversity. Impacts would persist as long as surface disturbance and vegetation loss continue. In general, the loss of soil productivity would be directly at the point of disturbance; even so, long-term vegetation diversity and habitat value could be reduced due to fragmentation and the increased potential for invasive species to spread from the developments or disturbances. Alternative A would have the greatest potential for short-term loss of productivity and diversity due to the high level of potential development and the lack of stringent mitigation and reclamation standards contained in Alternatives B, C, D, and F. Alternative C would provide the greatest long-term productivity by excluding development in many areas through closures or application of severe restrictions on development.

ROWs/SUAs and the short-term use of GRSG habitat, for energy and minerals could impair the long-term productivity of GRSG populations. This would happen by displacing animals from primary habitats and removing components of these habitats that might not be restored for more than 20 years. These short-term uses could also affect the long-term sustainability of some special status species. The potential for these impacts would vary by alternative because long-term deterioration of GRSG habitat as a result of mineral activity would be more evident under Alternative A. The short-term resource uses associated with travel and transportation and

mineral development (individual short OHV trips, oil and gas seismic exploration, natural gas test well drilling, and the noise associated with these activities) would have adverse impacts on the long-term productivity of GRSG populations. This would be the case if these resource uses were to infringe on GRSG winter habitat, brood-rearing habitat, and summer habitat. These activities, though short-term individually, could have collective long-term impacts on GRSG productivity and health if they were to increase in the long term